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finish

FROM RAW METAL TO FINISHED PRODUCT

*Colors
You Can
Count on-*

**IN YOUR
PRODUCTION
IN YOUR
SALES**

That's Our Business!



BILL WENNING



FRANK KOHNE



BURGESS HURD

All of us have been through a former period of shortages recently enough to remember it, and to profit by our experience. We made it our policy then — and will do so again — to take care of our regular customers and to leave no stone unturned to provide for their needs. Due to shortages and controls, our research and processing equipment is actively engaged in testing and processing available materials for conversion into useable products. Our laboratory equipment for testing and our processing equipment and experience give assurance that every order which is filled by "Ceramic" will be up to the quality standards which have previously been maintained.

Meet us at the A. C. S. Convention

Bill Wenning, Frank Kohne, and Burgess Hurd will be in our headquarters in the Palmer House in Chicago to greet you. We would be glad to discuss your problems with you.



"Ceramic" Colors

CERAMIC COLOR & CHEMICAL MFG. CO.

New Brighton, Pa., U.S.A.



Coming up with the answers

THE deeper and farther you look for enameling information the more you are likely to find. That's one reason why Armco Enameling Specialists spend a good part of their time in the field—visiting enameling plants in every part of the country.

By studying such operations as forming, cleaning, spraying and firing *right in the plants*, they can come up with the answers needed to produce top-performing enameling stock.

When you combine a practical approach like this with an unexcelled record of laboratory research, you have something. And that "something" is today's Armco Enameling Iron, a product known throughout the industry for its uniformity, ductility, sag resistance and freedom from gas-forming impurities.

On-the-Spot Help

This field work is helpful to the enameler in another way, too. When a new product is being developed—or an earlier one redesigned—Armco Specialists are glad to share their forty-two years of experience in helping solve production "bugs" and other problems. By coming up with the right answers *on the spot*, they save the enameler time, money and material.

While all types of steel are scarce today, it will pay you to remember some of the reasons why Armco Enameling Iron is the "world's standard" for fine porcelain enameling. They are the same reasons why tomorrow's Armco Enameling Iron will be even better.

ARMCO STEEL CORPORATION

151 CURTIS STREET MIDDLETOWN, OHIO
Export: The Armco International Corporation



HARSHAW

Fluoborate

Plating Chemicals

**LEAD
FLUOBORATE**

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ACID**

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

**Order from the nearest
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COMPLETE *Finishing* SYSTEMS

for ENAMEL • LACQUER • PAINT



Two Mahon Gas-Fired Dry-Off Ovens which bodies enter immediately following wet sanding and rinse operations.



Cooling Tunnels at exit end of Dry-Off Ovens saves floor space, exhaust excessive heat otherwise radiated within the plant.



Mahon Direct Gas-Fired, Tunnel Type Finish Baking Oven with Cooling Tunnel at exit end partially exposed.



Tack-Off Booth at entrance to Two-Tone and Repair Spray Booth. Filtered Air is supplied to this Tack-Off Booth and is maintained at slight pressure to exclude factory dust.

... the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

MODERN MAHON FINISHING EQUIPMENT Will Do A Better Job of Finishing for YOU Too!

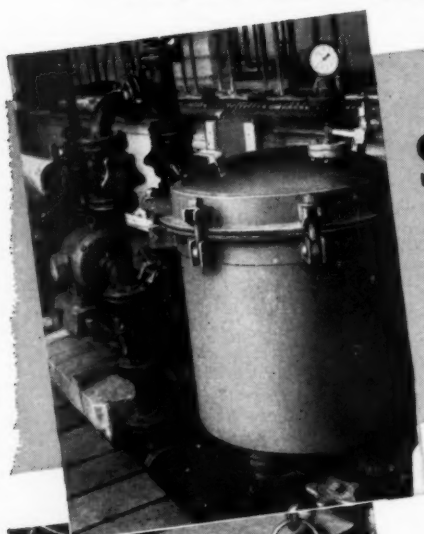
Progressive manufacturers today insist on modern Mahon Finishing Equipment . . . they pay a little more for the many new features engineered into these systems to reduce maintenance, provide better working conditions, and produce finer finishes at lower cost. Illustrated here are some of the major units of equipment in a complete Mahon finishing system specially designed to process automobile bodies. This system comprises two complete finishing production lines and an additional two-tone and repair line . . . some of the innovations include an elaborate air supply and distribution system, "Hydraire" flood sheets, for more efficient control of air flow within the down-draft spray booths, automatic sludge segregators and unloaders to eliminate the necessity for extensive periodic cleaning, cooling tunnels at exit ends of drying and baking ovens to conserve floor space and exhaust the excessive heat which the hot bodies would otherwise radiate within the plant. When you are in need of new finishing equipment it will pay you to take advantage of the experience and the wealth of technical knowledge and practical know-how accumulated by Mahon engineers in thirty years of leadership in this field. See Mahon's Insert in Sweet's Mech. Ind. File, or write for Catalog A-650.

THE R. C. MAHON COMPANY
HOME OFFICE and PLANT, Detroit 34, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning and Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Dry-Off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Systems, and Drying and Baking Ovens; Core Ovens, Dust Collecting Systems, Fog-Filters, and many other Units of Special Equipment.

MAHON

**No repairs or maintenance
in over 17,000 hours of
'round-the-clock operation**



**... yet this
SPARKLER
Horizontal Plate
FILTER
is still going strong**

The kind of service Sparkler Horizontal Plate Filters have given the Gillette Safety Razor Company—efficient and trouble-free, even under most extreme conditions—is the kind of service that is vital to *every* filtering operation.

For example: A rubber-lined Sparkler Model 8-18 filter is used by Gillette in the continuous filtration of a 1000-gallon bright nickel plating solution. Now operating for approximately two years, this filter has been on a 24 hours a day, 7 days a week schedule—without any loss of operating time for repairs or maintenance. Also used in periodic batch carbon treatments of nickel solutions this unit, according to Gillette technicians, consistently delivers a brilliantly clear effluent, even though the plates may be packed solid.

Another Sparkler Filter employed by Gillette is a Model 8-6, stainless steel, portable unit. Used exclusively for cyanide type plating solutions, this Model 8-6 has proved particularly valuable for Gillette's gold plating operations since the patented Sparkler Scavenger Plate assures minimum loss of precious gold solution. Now operating almost six months for at least 2 hours daily, its performance has been satisfactory in every respect.

Our Engineering Department (with more than 25 years' experience in every phase of filtration) is available for consultation without charge.



Top: Sparkler Model 8-18 filter shown installed in Gillette's plating department. Above: Same filter, with filter plate assembly being removed for cleaning

Left: Sparkler Model 8-6 stainless steel filter. This portable unit is used by Gillette to filter gold plating solutions.

SPARKLER MANUFACTURING CO.

MUNDELEIN, ILLINOIS

From the Editor's mail.

Business good in Australia

Gentlemen:

We have had a busy year in Australia, and the consumer demand, although slackening at the end of the last financial year, has now picked up again.

We are hoping in the next few months to bring out a fully automatic washing machine, but as you know there is a considerable amount of work to be done on tooling and so on before one of these can be produced in quantity. Our wringer-type washing machine we hope will hit the 500 per week early in the New Year, building up to 600 by the middle of the year, and our electric, gas and wood ranges have held around 600 per week, with a maximum of 655 throughout this last year . . .

John Simpson

A. Simpson & Son Limited
Adelaide, South Australia

READER QUESTIONS

Gentlemen:

We are interested in securing authentic information regarding the cause and remedy for "filiform corrosion" which seems to occur most frequently under conditions of high humidity. Any information you can furnish will be appreciated.

Allied Finishing Specialties Co.
Chicago, Illinois

Gentlemen:

In my department we print with ceramic ink and use steel dies. We have much trouble with our printing pads which are made of gelatine. We have trouble with melting the gelatine. When we make our pads, they include many bubbles which break from time to time, and ruin the pads. Is there any way to remedy this trouble?

Steven W. Wysenski
Pequabuck, Connecticut

any readers having answers to these problems are invited to send their answers to finish magazine.

APRIL • 1951 finish



PRECISION DIES AND JIGS make for more efficient production

For New Monarch engineers, the first step toward speeding up production of a product is the designing, with infinite care, the necessary precision dies and jigs. With their vast amount of specialized experience and the most modern tooling methods known, they often eliminate expensive and inefficient operations in the manufacture of an item.

New Monarch's 40 years of experience, skill and know-how, plus the most up-to-date mechanical facilities of its 3 modern plants, enable it to assist you in solving your most perplexing production problems.

Whether it be a single stamping or a complete from-blueprint-to-shipping-carton job, our pleasure is in aiding you to the highest possible efficiency in the production of your product—depending, necessarily, on the availability of materials.

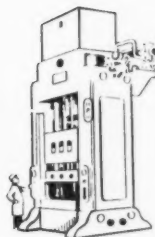
Write today for information



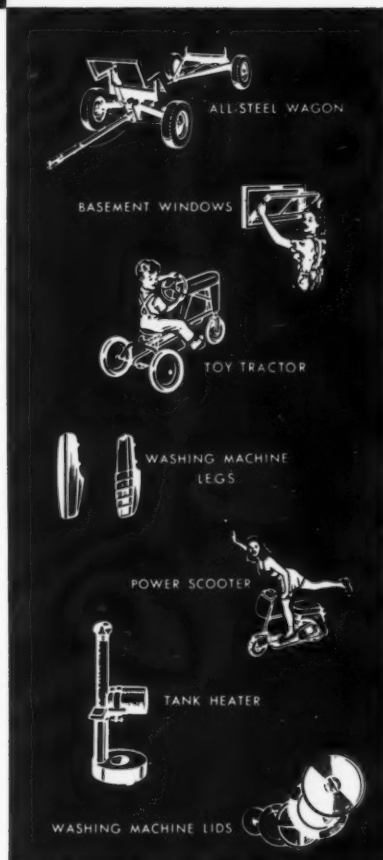
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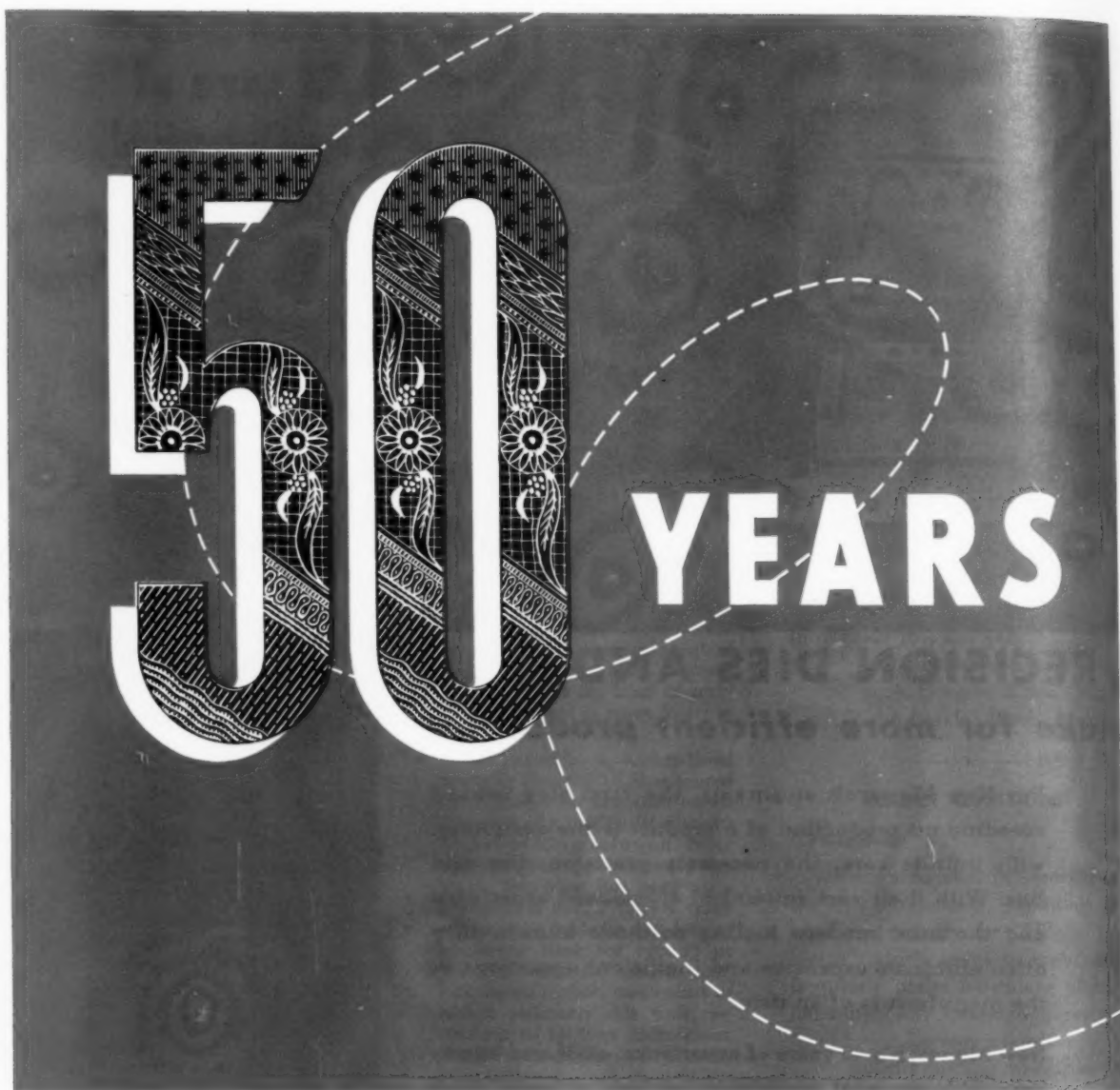
When you think of Stampings, think of

NEW MONARCH MACHINE & STAMPING CO.
406 S. W. NINTH STREET
DES MOINES 9, IOWA



We have, ready to serve you, a complete battery of modern punch presses ranging in capacity from 500 lbs. to 500 tons.





And Stronger Than Ever!

Fifty Years Young!

Back there in 1901, when this company was founded, everybody connected with it was full of ambition, energy and *curiosity*. It was curiosity which led Ing-Rich to experiment, to try methods which people said wouldn't work, and thereby to make significant contributions to the progressive manufacture of frit.

Fifty Years Young!

Throughout this entire half-century, Ing-Rich not only has kept those qualities, but has added another . . . the determination to see that Ing-Rich PORCELFRIT works for you. This resolve led to *plant testing*, whereby all errors in formula or

manufacture are eliminated *before* you receive PORCELFRIT, and to the services of Ing-Rich service engineers without obligation to the customer.

Fifty Years Young!

It is worth much to the entire industry to have a manufacturer . . . established fifty years ago . . . whose receptiveness to new ideas is as fresh and eager as it was at the start. Of this you may be sure: fifty years hence, Ing-Rich will still be seeking the better way to turn out a product that will win—and merit—the customer's satisfaction. This flexibility, this genuinely youthful spirit, leads us to say, with justified pride, that we are now ***Fifty Years Young!***

YOUNG

ING-RICH

PORCELFRIT

"The Plant Tested Frit"

SIX GOOD REASONS FOR USING PORCELFRIT

1. EXPERIENCE—Since 1901 Ing-Rich has pioneered in porcelain enameling. We have learned a lot in that time—and our customers profit by it.

2. PLANT TESTING—Right in our own job enameling plant, under conditions of actual use, we use PORCELFRIT. When you get it, *it's right!*

3. FEWER REJECTS—Rejects cut your profits and PORCELFRIT cuts rejects to a minimum.

4. SERVICE ENGINEERING—Our service engineers are available to make sure that PORCELFRIT works right for your product . . . you take no chances.

5. LABORATORY CONTROL—Our ceramic engineers maintain constant contact with the production staff to make sure of highest quality.

6. IMPROVED SMELTING—Ing-Rich uses unquestionably the world's finest smelting method, the result of exhaustive research and experiment.

This Well-Known Trade Mark Stands For Half a Century of PORCELFRIT

This company would be remiss if it did not express its very real gratitude to those customers of long standing who have done so much to bring honor and acceptance to the famous PORCELFRIT trade mark.

Some of you have been with us almost from the beginning; others have joined the ranks at later dates. We would not be human if we did not get a

warm glow of satisfaction from the fact that practically all of you have become *steady* customers.

Ing-Rich thanks all of you individually and collectively. And to those who have not yet tried PORCELFRIT, here is a cordial invitation to investigate the superiority of the Plant-Tested Frit—PORCELFRIT.

Ingram-Richardson, Inc.

OFFICES, LABORATORY AND PLANT • FRANKFORT, INDIANA

YEP!!

We licked 90% of our
pickle room
problems...with...

MACCO DRAWING COMPOUNDS
and
MACCO ENAMEL CLEANERS



Like dozens of plants all over the country, you too can lick 90% of your pickle room problems with--Macco Drawing Compounds...and...Macco Enamel Cleaners.

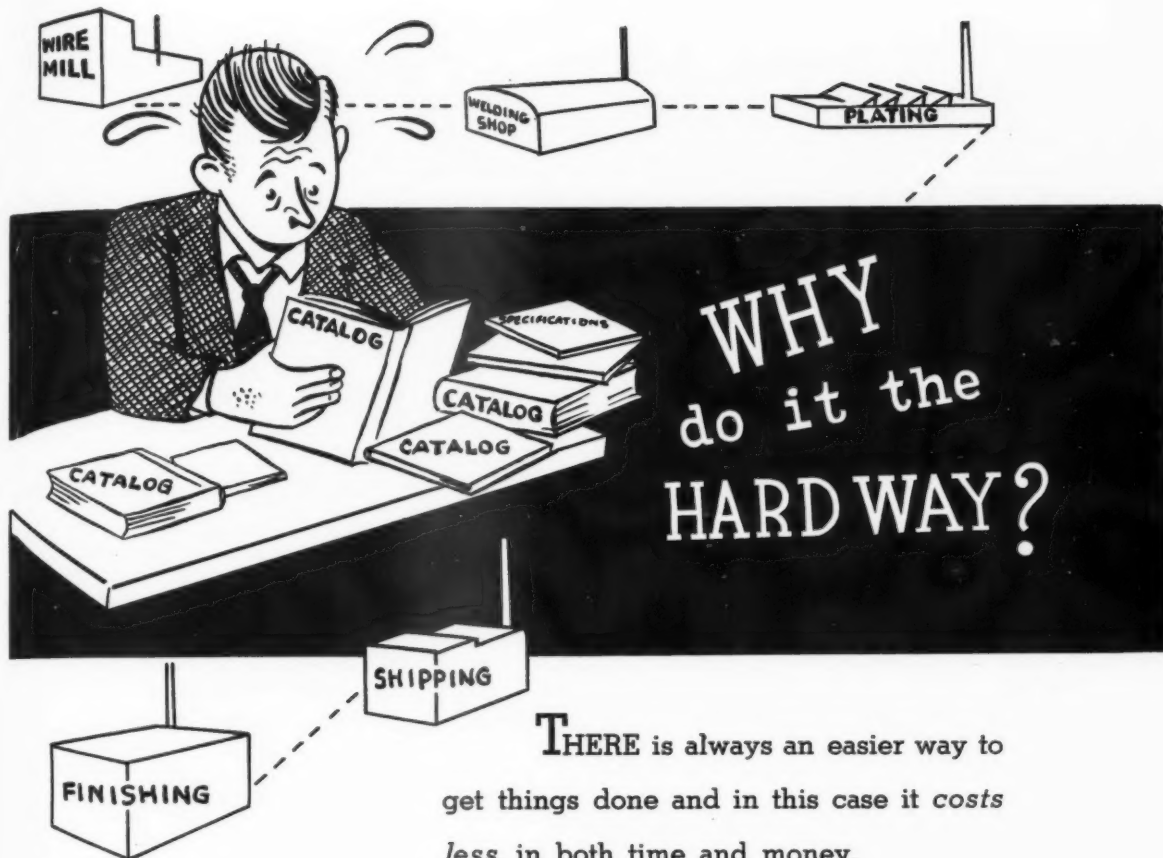
These fine, job-tested products were specially formulated for porcelain enameling. They were designed to work together to reduce scrap and cut press down time. And, when used together they eliminate 90% of the cause of rejects--due to incompatible drawing and cleaning compounds.

It won't cost you one cent for positive proof--in your plant. Macco engineers, equipped with the results of more than 20 years' experience and know-how, will be glad to recommend the Macco Drawing Compound... and...Macco Enamel Cleaner which will do the job for you. Write or phone. No obligation.



FOR THE METAL WORKING TRADE--SINCE 1931

525 W. 76th STREET ★ CHICAGO 20, ILL.



THERE is always an easier way to get things done and in this case it *costs less*, in both time and money.

As contract suppliers of fabricated wire products, welded steel wire shelves, baskets, wire shapes, we are *completely* equipped to handle any job. Starting with a design *engineered* for economical production, we produce with automatic machines, then finish in our own plant to *your* specification.

We *know* we can deliver a better product and we know we can save you money. Why not let us try?

SUB CONTRACTS ON WAR GOODS

We have 385,000 square feet of plant equipped with modern machines, devoted to welded wire fabrication. Our facilities are available to you for your sheet metal, formed wire and welded wire assembly requirements. All operations in one plant in non-strategic area, well served by all forms of major transportation. Explanatory facilities folder will be sent upon request.



UNION STEEL PRODUCTS COMPANY

Wire Products Division • ALBION, MICHIGAN

Fabricators of Welded Wire Products—Manufacturers of steel wire Pallets and PALLETAINERS for material handling and shipment—WENDWAY Conveyors for plant efficiency.

Spray Your Products **ELECTRONICALLY**

USE UP TO

70% LESS PAINT

WITH THE *New* ASHDEE
ELECTRONIC

PAINT MISER



Turns Paint Losses into Profits

Why spray away thousands of dollars in paint waste annually, when it's so easy to save almost every bit with the sensational new Paint-Miser. Used in conjunction with your present finishing equipment, Paint-Miser precipitates up to 95% of the paint on the work . . . practically abolishes off-spray. Adapts readily to any finishing department . . . extensive changes not required. Put Paint-Miser to work for you now . . . it will effect tremendous savings in both paint and man-hours, and greatly reduce operating costs. Paint-Miser is sold outright. No royalties to pay. It's in a class by itself. Write, wire for complete details at once!

Get Far Greater Production...Cut operating costs
Get Better, More Uniform Coverage
Use Less Manpower... Use Less Air
Reduces Off-Spray to a Minimum
No Build-Up or "Fatty" Edges
Saves Thousands of Dollars Yearly
No royalties to pay... you can buy it outright



ASHDEE PRODUCTS, INC.

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KEMCLAD

KEMVAR

HEETCLAD

SUPERCLAD

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DIMENSO



G. L. Hehl, General Manager,
General Industrial Division.

**"If the label says KEMVAR
it will be KEMVAR!"**

*A statement of policy to users of
Sherwin-Williams Industrial Finishes . . .*

...for CIVILIAN production:

"To aid manufacturers in protecting and maintaining their finishing standards, Sherwin-Williams makes this statement of policy:

"Restrictions in the supply of some of the quality ingredients of such well-known, standard Sherwin-Williams industrial finishes as Kemvar, Kemclad and others may affect the *quantity* of such finishes that can be supplied.

"So long as these branded finishes can be supplied at all, however, no deviation in their *quality* will be permitted.

"Users of such finishes can therefore be assured that if a label *says* KEMVAR, the material so labeled will *be* KEMVAR, as nearly unvarying in established performance characteristics, both on the production line and afterwards, as strict quality control can make it."

...for DEFENSE production:

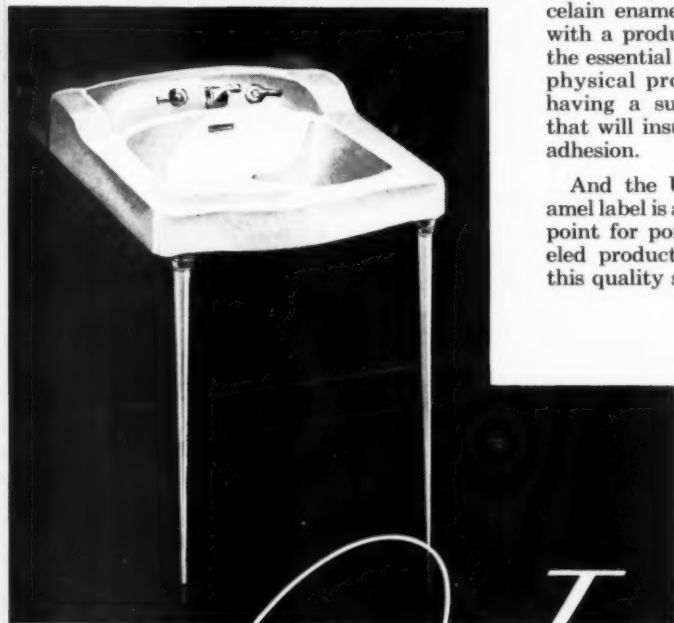
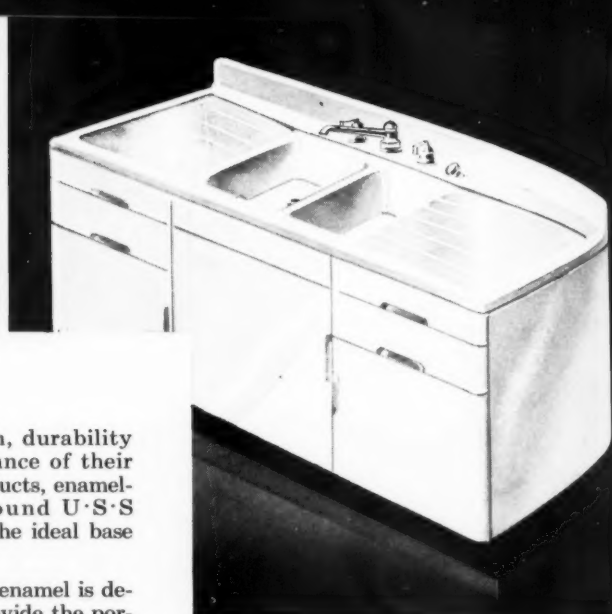
"The same integrity of product and appreciation of practical production problems is assured to users of Sherwin-Williams finishes for defense order production as for their civilian requirements.

"Every effort will be made by Sherwin-Williams finish technicians to furnish defense manufacturers with suggestions for making necessary change-overs to meet government finishing specifications accurately in spirit as well as letter, with least possible modifications of existing equipment."

Sherwin-Williams background of experience extending through two World Wars will be made available on any defense production problems, through facilities extending from coast to coast. Call, wire or write The Sherwin-Williams Co., 101 Prospect Avenue, Cleveland 1, Ohio.

SHERWIN-WILLIAMS
INDUSTRIAL FINISHES





For strength, durability and appearance of their finished products, enamellers have found U·S·S Vitrenamel the ideal base material.

U·S·S Vitrenamel is designed to provide the porcelain enameling industry with a product possessing the essential chemical and physical properties, and having a surface texture that will insure maximum adhesion.

And the U·S·S Vitrenamel label is an added sales point for porcelain enameled products made from this quality steel.

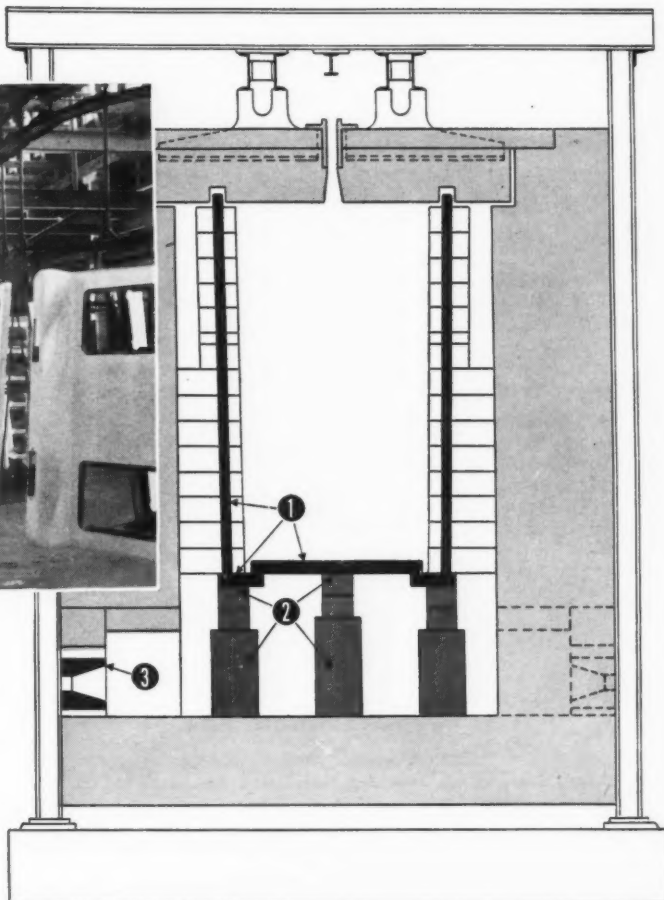
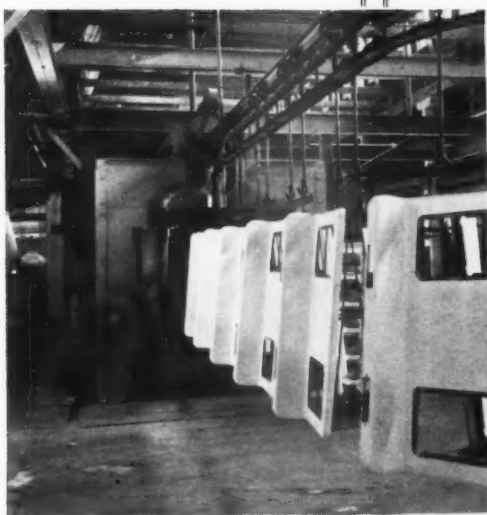
FOR A DEPENDABLE ENAMELING STEEL

U·S·S Vitrenamel



UNITED STATES STEEL COMPANY, PITTSBURGH • COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL



You will find
Super Refractories
in almost every
enameling furnace

Super Refractories by CARBORUNDUM pay their way many times over by helping to keep output up and costs down in continuous enameling furnaces.

If you have not tried these materials, or are not sure you have made maximum savings possible by using them, we would like to have you talk to a member of our engineering staff. There's no obligation. A letter to the address below will enable us to set up a meeting that will meet your convenience.

In continuous furnaces of this general type, Super Refractories by CARBORUNDUM are used because of a combination of three different properties. They have great hot strength, even at temperatures far above those reached in enameling operations. They have good resistance to spalling and thermal shock. And, in the case of ALFRAX electrically fused alumina and CARBOFRAX silicon carbide refractories, they have very high heat conductivity.

- ① ALFRAX or CARBOFRAX muffle (usually depending on operating rate) gives you maximum transfer of heat from combustion chamber to hot zone. CARBOFRAX preheat bottoms are often employed for the same reason.
- ② Either CARBOFRAX silicon carbide or MULLFRAX electric-furnace mullite material (depending on fuel and method of operation) is best for support arches, pier facing and leveling brick.
- ③ For burner blocks, MULLFRAX refractories, with high hot strength and low conductivity, are usually preferred.



THE CARBORUNDUM COMPANY

Dept. K-41, Refractories Div.

Perth Amboy, New Jersey

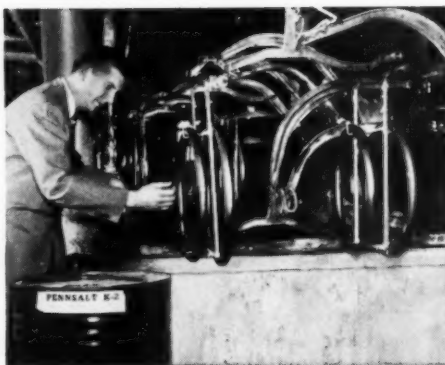
"Carborundum," "Alfrax," "Carbofrax," and "Mullfrax" are registered trademarks which indicate manufacture by The Carborundum Company.

At Maytag

quality control counts

...and PENNSALT CLEANERS fill the bill

1 Pennsalt Cleaner being used in a Stevens Automatic Conveyor machine at the Maytag Plant. Pennsalt K-2 Cleaner is used in proportions of 8 oz. to a gal. of water at 212° F. for a 2-minute electroclean.



2 Along with the conveyor-type cleaning machine, Maytag uses this Stevens Automatic Barrel machine for cleaning small parts. Same solution of Pennsalt Cleaner is used as on conveyor cleaner.



3 The Washer that goes to the cleaners first! The Maytag Automatic Washer is a favorite among home-makers throughout the country for its smart appearance and long life. Pennsalt Cleaners are also used for cleaning the sheet steel prior to porcelain enameling for outside parts.



In the Maytag Company's Newton, Iowa, manufacturing plant, Pennsalt Cleaners take on the tough job of removing cutting lubricants, drawing and stamping compounds, carbon smut, and shop dirt from washing machine parts prior to zinc plating. In just two minutes, Pennsalt Cleaners remove this soil; get steel parts clean and ready for subsequent finishing steps. This is quick, efficient, economical cleaning—the kind you can count on with Pennsalt Cleaners in your plant!

There are efficient Pennsalt Cleaners for every metal-finishing operation—a special cleaner to meet every problem. *And all Pennsalt Cleaners have these advantages in common:*

They are concentrated cleaners—most of them anhydrous. You can use a minimum of cleaning compound; you don't pay for excess water.

They have long life—frequent dumping of large process tanks is unnecessary. Furthermore, most Pennsalt Cleaners are made from fused materials—you get a uniform solution every time you make up a new charge.

They are free rinsing in either hot or cold water. You get cleaner metal, less drag-out, less contamination of subsequent steps.

Get the complete story on Pennsalt® Cleaners and how they can save time and money in your plant. The Pennsalt Representative in your locality will be glad to study your present cleaning method and make recommendations without obligation. Or, write: Special Chemicals Department, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa.

*There's a Pennsalt Cleaner
for every
metal cleaning operation*



PROGRESSIVE CHEMISTRY FOR OVER A CENTURY

Easier on the



Safer for the



Lighter on the

MILL

MIX

COST

MCDANEL



Mill linings last longer when McDanel Vitreous Porcelain Grinding Balls are used in the grinding operation. That's because McDanel Balls are engineered for the particular job they have to do.

By using McDanel Balls a purer milled batch is obtained for the porcelain body of McDanel Grinding Balls blends right in with the enamel batch as the ball wears in grinding.

Costs come down when McDanel Balls do the grinding. Not only do McDanel Balls cost less per ton, but their longer wear and service means fewer balls to buy over a period of time.

For speedy, safe, and economical grinding, always specify McDanel.

Write Today for 1951 Catalog
containing full data on
McDanel Porcelain Products

• **HAND ROLLED GRINDING BALLS**

Made from specially developed vitreous porcelain body and hand rolled for faster, uniform grinding. Mill tested and individually inspected before shipment to you.

• **MILL LINING BRICK**

Low in glass content, McDanel Mill Lining Brick gives maximum resistance to wear and long, satisfactory service. Complete size range to fit every size mill.

• **MILL HEAD ASSEMBLIES**

Be sure to specify McDanel Mill Head Assemblies on your new mills. No metal can contaminate your mill charge with these patented covers. They are tops for uniformity of batch and long service.

• **METAL COVERED GRINDING JARS AND MILLS**

Protected with heavy gage steel jacket McDanel Metal Covered Grinding Jars and Mills are easy to handle, easy to clean, discharge rapidly and stand up under long usage.

West Coast Representative

Fernholtz Machinery Company, 150 N. Norton Ave.,
Los Angeles, Calif.

MCDANEL
Industrial
PORCELAINS



MCDANEL REFRACTORY PORCELAIN CO.
BEAVER FALLS, PENNA.

Chicago Vitreous Enamel Product Company

Exclusive Representative for the Enameling Industry



When a TAM* field engineer calls...

You can obtain a wealth of practical, useful and authoritative information by discussing your technical problems with a TAM sales engineer. He is well equipped to work for and with you. More than ten years ago he received his degree in Ceramic Engineering from one of our leading universities. Since then, his education has been broadened by wide experience. In the field, he has had his coat off and his hand-in on more than a few plant projects. His advance informa-

tion on new developments and applications is a valuable asset.

Here is a man ready to work with you. You will find him intelligent and cooperative—quick to understand your problems. Furthermore, he is your direct contact with a fully equipped and staffed headquarters that is the source of much worthwhile information and data. When your TAM engineer calls, get the full value that his background offers you.



*TAM is a registered trademark.

Registered U. S. Pat. Off.

TITANIUM ALLOY MFG. DIVISION NATIONAL LEAD COMPANY

Executive and Sales Office: 111 BROADWAY, NEW YORK CITY • General Offices, Works, and Research Laboratories: NIAGARA FALLS, N. Y.

THE O. HOMMEL COMPANY

60*

YEARS
OF

..... *Significant Progress*

We salute our customers and our suppliers. It has been through your loyalty that we have been able to grow and prosper. Sixty years of experience and continued progress through research are your guarantee of quality products.

Ernest M. Hommel

THE O. HOMMEL CO.

PITTSBURGH 30, PA.

Pacific Coast Agent L. H. BUTCHER CO.

World's Most Complete Ceramic Supplier

POTTERY, STEEL AND CAST IRON FRIT
CERAMIC COLORS • CHEMICALS • SUPPLIES

Our Technical Staff and Samples are available to you without obligation. Let us help you with your problems.

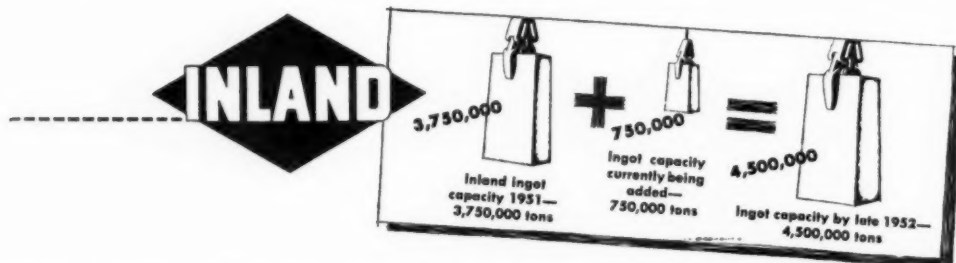


It's the fellow with the long white whiskers and the "DO" engraved on his brief case. He's asking for a lot of our steel. And he's getting it.

While his purchases may hurt some of our regular customers, we're far from reluctant to help him out . . . for we want him to be ready to do whatever is required, if and when Uncle Joe starts the fireworks.

More scrap
from you...
means more
steel for you

In the meantime, we're building so that he, and all of our friends in the midwest, will have more steel.



INLAND STEEL COMPANY. 38 South Dearborn Street, Chicago 3, Illinois

Principal Products: Sheets, Strip, Tin Mill Products, Bar Mill Products, Plates, Structural Shapes, Floor Plate, Piling, Reinforcing Bars, Rails and Track Accessories, Pig Iron, Coal Chemicals.

Sales Offices: Chicago • Davenport • Detroit • Indianapolis • Kansas City • Milwaukee • New York • St. Paul • St. Louis.

Tooling for limited production

an article of importance to manufacturers who will be taking sub-contracts or special defense work requiring experimental models or short-run production of precision parts

by *Gilbert C. Close* • FINISH CORRESPONDENT



Airplant tooling engineers have always faced the difficult problem of developing high precision tooling for relatively limited use. A contract for a hundred airplanes at one time is considered a big order. More generally, and in conjunction with military aircraft production, prototype experimental models will outnumber production models three to one. A high precision tool demanding months of design, development and fabrication time, will often be used to produce less than a hundred parts. In such cases tooling costs on the part will outstrip material costs many times.

This situation has given rise within the aircraft industry to stress on the development of limited production tools that are relatively cheap to de-

sign and fabricate, and on tools that can be used to produce more than one part. Some knowledge of what airplant tooling engineers have accomplished along this line will be of substantial value to the hundreds of companies faced with sub-contract work during the defense program.

In a paper presented recently at the Third Annual Industrial Engineering Institute, at Berkeley, California, T. E. Piper, chief materials and process engineer of Northrop Aircraft, Inc., pointed out definite strides made by his company in the design and development of limited production tools. This article is based on Piper's discussion plus observation by the author of the various tools and techniques described.

Tools analyzed

Piper pointed out that any discussion of tooling must include some

discussion of the processes for which they are used, such as welding, forming, or fabrication. Tools, he said, are but instruments for the accomplishment of these processes, and the quality and precision of the finished part reflects accurately the value of the tools used in producing it.

In general, three types of tools are employed: (1) experimental or job-shop tools used in the production of from one to several parts, (2) limited production tools used to produce from 20 to 500 parts, and (3) mass production tools used to produce thousands of parts. It is obvious that mass production tools will have to be substantial and almost wear-proof, and in this respect it seems that they would be best for the high precision required of aircraft components. But new materials and new tool fabrication techniques have disproved this point. It is now possible

Fig. 1—View of an airplane strut fairing (top) made from laminated glass fiber cloth plastics, and trim plates (bottom) with actual parts shown partially nested in templates to indicate relation of template to part.





Fig. 2 — Thermosetting cast phenolic resin contoured dies used for the fabrication of laminated glass fiber plastic parts.

to produce with reasonable economy high precision tools that will reproduce a limited number of parts as accurately as mass production tools will reproduce thousands. When these limited production tools can be changed over to produce a number of parts, economy is further enhanced. From this standpoint, and incorporating added in-built wearability, it may be observed that mass production tools are but highly specialized limited production tools.

Wearability and versatility are the factors that lend a tool its status as a mass or limited production development. When less wearability is required, cheaper materials can be used which are much easier to fabricate than long wearing metals. When a

tool can be designed versatile enough for producing several parts, and even though this increased use demands better wearability, the elimination of other tool requirements keeps costs down. In either case, one because of reduced wearability, the other because the tool's time is divided between several parts, a limited production status is attained.

Most of the recent aircraft tooling developments Piper described in his paper are of the limited production type, but this status and the nature of their use does not limit them to aircraft use.

Plastics as tools

Plastics are being used more and more extensively in aircraft work, not

only to produce light weight airplane parts, but also as a material for limited production and experimental type tooling. The advantages of the use of plastics in tooling may be enumerated as: (1) lightness in comparison with equally strong or rigid metallic tools, (2) simplicity of fabricating plastic tools, (3) short labor and shop time involved in tool fabrication, (4) comparative low cost of plastic materials, (5) inherent stability and strength of the plastic materials and their great resistance to dimensional change, and (6) the fact that excessive tool abuse is readily detectable. In this last instance, if a plastic tool is dropped or bumped with sufficient impact to alter its dimensions, it is readily noticeable and it will not continue to be used in the production of faulty parts.

The main disadvantage of the use of plastics in some types of tools is that it abrades more easily than metal. In some cases, this can be compensated for by metallic facings on areas subject to greatest wear.

Figure 1 shows a strut fairing made from laminated glass fiber cloth plastics. The lower half shows drill and trim templates made by the same process with actual parts shown partially nested in the box templates to indicate the relation of template to part. In this particular instance, both the tooling and the part produced are made of the same material. However, plastic templates may also be used for metal parts.

A tool like that shown in Figure 1 is produced by laying glass fiber cloth over a part or a die, impregnating each layer of the cloth with a polyester resin, covering with a pressure bag when necessary, and allowing the impregnated fiber glass to air harden. After curing, the laminated glass fiber plastic template is removed, drill bushings attached for drilling, edges

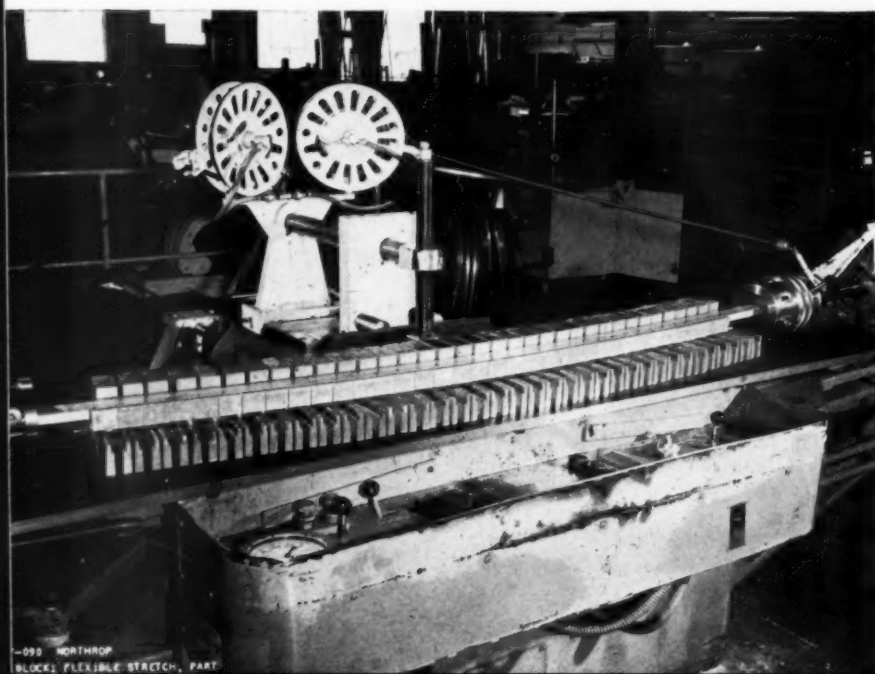


Fig. 4 — General view of the flexible cavity adjustable stretch form block being used to stretch-form a 75S-T6 high strength aluminum alloy extrusion. Note rigidly mounted but adjustable angle blocks which back up each segment of the flexible "snake" in which the extrusion is nested.

cut to the desired trim line, and, if necessary, metal facings added. This type of laminated glass fiber plastic is now being used also for assembly trim and drill templates, and for various welding fixtures.

The contour dies shown in Figure 2 are thermosetting cast phenolic resin widely used for fabricating plastic parts. This same type of material and same method of making a die may be used to produce pin rotor jigs, holding fixtures, mill fixtures, duplicating masters, matrix molds for the electroforming process, postforming dies, trim and drill fixtures, stretch press dies, duplicating patterns, etc. Mechanical properties of the cast thermosetting phenolic resins are from 5000 to 9000 psi ultimate tensile strength, from 14,000 to 20,000 psi ultimate compressive strength, and from 5000 to 7000 psi shear strength.

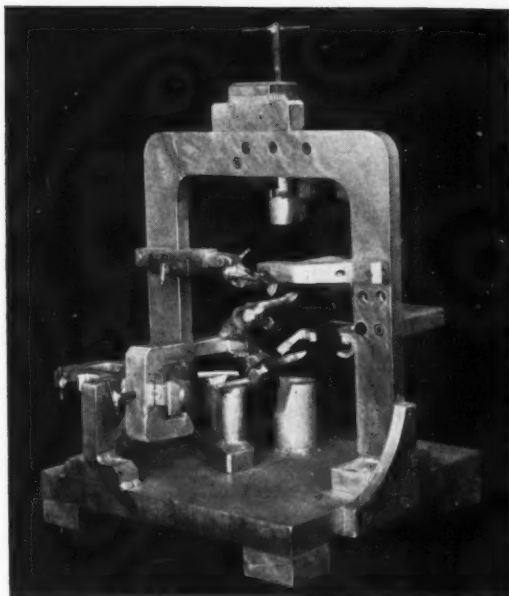
These typical illustrations only touch upon the possibilities of plastics in the fabrication of limited use tooling. Along with lower material costs, shop time and the number of steps used in producing a plastic die or template are substantially less than when using metal.

Welding fixtures

The use of magnesium for a typical welding fixture is shown in Figure 3. Magnesium jigs, when used in conjunction with welding either magnesium or aluminum components reduce warpage considerably. This is because the thermal expansion of the jig compares favorably with that of the metal being fabricated. When steel jigs are used, resulting in a different coefficient of expansion, warpage during pre-heating and welding is often so serious that critical straightening problems accrue.

Currently, magnesium is largely

Fig. 3 — An all-magnesium weld jig used for weld fabrication of an aluminum part. Magnesium is easy to fabricate, and very light. Such jigs can be built more quickly and cheaply than all-steel jigs.



replacing steel in the building of aircraft welding jigs. Steel is limited to those portions of the jig where great rigidity, strength and stability are required. To further reduce warpage, it has been found expedient to strain relieve the part while still in the jig.

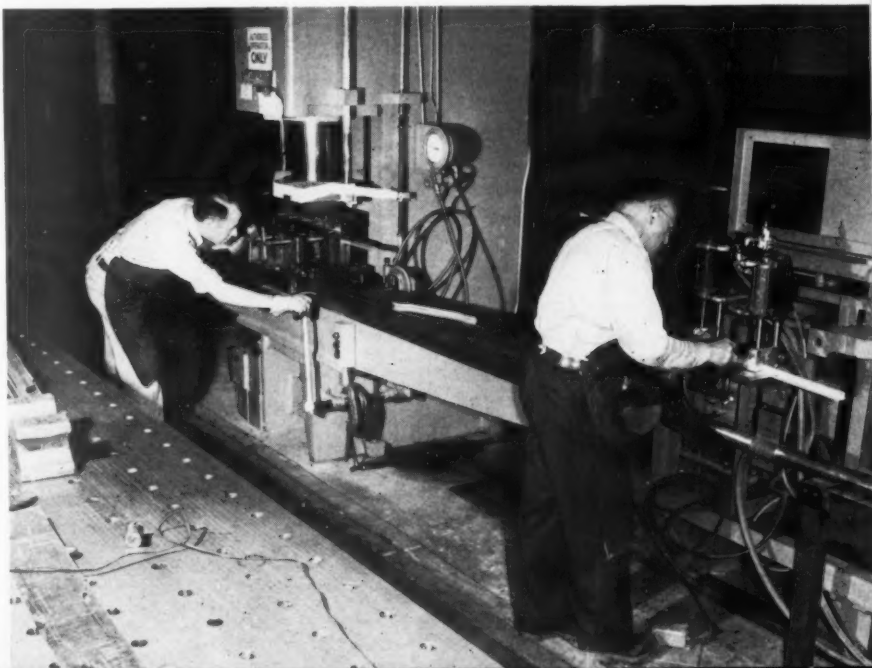
While magnesium is not as strong as steel, and it is obvious that steel is an ideal material for a jig that will be used in the weld fabrication of thousands of similar parts, the lower cost of magnesium and the ease with which it can be fabricated makes it an ideal material for welding jigs of

relative limited use. Magnesium jigs are also much lighter and easier to handle, thus adding to personnel efficiency and speed.

Metal forming equipment for limited production work

In limited production work, the larger metal brakes, presses, stretch presses, etc., prove more adaptable and economical than small specialized equipment. By varying the tooling used with these large presses, a wide range of forming work can be accomplished, from very small jobs to jobs that require the full power available.

Fig. 5 — Hot forming high strength aluminum alloy extrusions. Portable electrical resistance heating unit (right) is located so that a minimum of time is lost in transferring heated work to press.



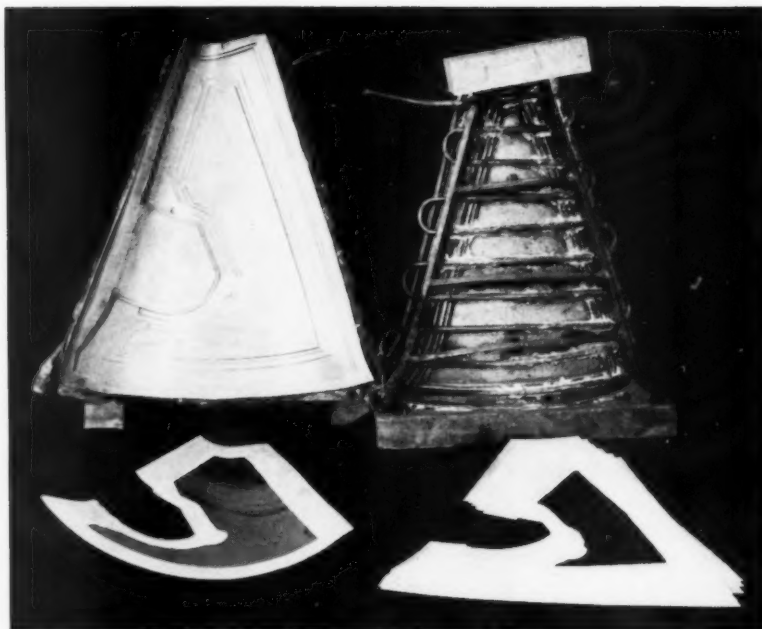


Fig. 6—Electroformed die for producing plastic parts. Note steel reinforcing and coiled copper heating tubes on back of die. Sprayed metal is used to improve thermal conductivity between heating coils and die.

A large hydraulic brake modified to produce airplane wing leading edges by stretch forming was described in a recent issue of *finish*. Another interesting development by Northrop tooling engineers is the flexible cavity stretch form block used in stretch forming of high-strength aluminum alloy extrusions.

Previously a stretch form block of Masonite, aluminum alloy, or zinc alloy, was required for each individual part to be formed. With the current method one flexible cavity "snake" is required for each shape and size of extrusion, but with this flexible cavity the extrusion can be formed to any contour over 50 inches in radius and in any position or degree of twist.

The flexible cavity snake is made by casting cerro-matrix around an extrusion of the desired cross-sectional shape. The extrusion is then removed and the cerro-matrix casting is cut into short (2" or under) segments. These segments are then drilled and strung on cables much like a strand of beads.

Angle blocks that can be adjusted back and forth by means of a cap screw are mounted on the stretch press bed. One angle block backs up each flexible cavity segment.

In practice, the adjustable angle blocks are adjusted to the desired

length and contour with a template. The extrusion to be formed is then nested in the flexible cavity in the position desired and its ends are mounted in the stretch jaws. During stretching, the flexible cavity sections

Editor's Note:

This is primarily an "idea" article for readers of *finish*. It offers tooling engineers tried and tested data for tool development in line with limited defense work production contracts.

The information presented in this article is of importance to manufacturers who will be taking sub-contracts or special defense work requiring experimental models or short-run production of precision parts.

conform to the pre-set contour of the angle blocks, thus producing the formed part. No springback allowance is required as during stretching the extrusion is stressed beyond its yield point and the metal sets rigidly in the new contour when stretching stresses are relieved. A close study of Figure 4 will reveal the details of this highly useful new stretch forming technique.

Hot forming of the high strength aluminum alloys (Figure 5), and of extrusions, is another technique that has been brought to perfection in the Northrop shops. Both the oil bath and electrical resistance methods of heating are used. Main advantage

of hot forming is that the parts can be formed in the fully heat treated or "ST" condition, thus eliminating the time-consuming and critical straightening operations that were necessary when parts were cold formed in the soft condition, then heat treated. Warpage during heat treatment necessitated the straightening. By eliminating this straightening operation, the time advantage of hot forming over cold forming is about 60 to 1.

Irregular shaped extrusions are heated in an oil bath; extrusions of the same cross sectional area between the contact points are heated by the electrical resistance method. Optimum forming temperature is 300° F. Extrusions may be held at this forming temperature up to an hour without impairment of their physical characteristics, thus simplifying shop use of the technique. The time required to bring parts to forming temperature in the oil bath varies, of course, in direct proportion to the cross sectional area. The electrical resistance heating units are provided with controls so that heating time can be standardized at one minute. The dies on the various presses employed in hot forming work are heated to approximately 300° F. by means of electrical heating unit inserts.

A tooling development by North American Aviation, Inc., will be of general interest to anyone interested in limited use tooling, and especially when such tooling is used in the production of plastic parts. This method utilizes electroformed dies. One such electroformed die is shown in Figure 6. This particular development is a high strength, internally heated, light weight, low mass die of high thermal conductivity used in the fabrication of plastic parts.

Essentially, electroforming is a process for plating thick and strong layers of metals or alloys. The plating is done directly over a phenolic

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ADVANCE TOOLING *overcomes* "DOUBLE TROUBLE"

**New Tooling Method by ADVANCE
Solves Tough Stamping Problem**



Former methods of stamping double sump sinks were complicated and costly. Each half was drawn separately, then butt welded together to form a complete double-well sink. This method presented two major difficulties . . .

TROUBLE NO. 1 In addition to processing two separate parts, extra time and labor was required to trim, butt weld, and finish welding seam—greatly increasing the cost of the piece.

TROUBLE NO. 2 The welded seam always caused headaches after enameling. Enamel chipped off during production, in the warehouse, and often in the field where the full sales price of the product became a total loss.

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Automatic Dispenser Front (24 1/4" x 61")



Refrigerator Door Panel (28 1/2" x 43")



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Flow coating in the home appliance field

a description of the process, materials and equipment requirements, and control factors

by *C. O. Hutchinson* • TECHNICAL SERVICE DIRECTOR, NUBIAN INDUSTRIAL DIVISION,
THE GLIDDEN COMPANY, CHICAGO, ILLINOIS



There is nothing new in the principle of flow coating. It has been used for years in its simplest forms for specialized work. One field that has used it extensively is the farm equipment manufacturing industry. This simplest method of applying paint, combined with modern equipment, is now used successfully for prime coating complicated fabricated parts in the home appliance field.

Perhaps the simplest possible form of flow coating can be accomplished by pouring paint from a can onto the object to be coated.

As a second step in refining the application, the paint may be applied to the work from a hose, either by gravity or with a pump feed.

The third step may be compared to the principle of a lawnsprinkler. In this case the paint may be fed through a set of stationary nozzles in sufficient number to cover the area to be coated. An obvious variation provides for mechanical movement of the nozzles, as in the case of a rotating sprinkler.

As we progress from the use of a can of paint for pouring on a single object to the continuous application of a coating to thousands of square feet of fabricated parts, it becomes necessary to consider the problem of re-circulating the paint to prevent loss of materials.

Then, to get the benefit of one of the chief advantages of the process, the application of an even film thick-

ness over all surfaces, the material must be drained in a solvent laden atmosphere.

In instances where properly formulated materials are being applied in specially designed flow-coating machines, some remarkably fine results are being reported.

Production flow coating to date has been, for the most part, with baking finishes, including japans, alkyd-type primers and modified alkyd-type enamels.

Flow coating systems in use have been designed and developed for coating such products as home laundry appliances (washers, ironers, dryers); parts for refrigerators, such as condensers, compressors, assembly brackets, shells and doors; home freeze units; dishwashers; and structural steel members; and farm implements.

In application, the coating material is pumped from a supply tank through filters and temperature controlling equipment (heaters and/or coolers) through pressure regulating valves to various headers. Each header or feed pipe has an individual pressure control.

As the material is "flowed" onto the metal parts, it drains into collecting pans at the bottom of the machine through a sieve or strainer and into the supply tank or reservoir.

The ideal flow-coating machine would provide two tanks, one for paint and one for solvent. The tanks would be so connected with the pumping system that the entire machine may be flushed with solvent, thus permitting complete cleaning of the machine with a minimum of labor.

Nozzle design may vary with the

equipment and the coating problem. Units are in operation with stationary nozzles using from 1 to 388 separate nozzles. There is no practical limitation to size if all equipment is designed accordingly. However, the use of oversize equipment will result in excessive solvent consumption.

The design of nozzles may vary to provide a round or flat stream, or a so-called "fog nozzle" may be considered. Another type of equipment in use employs "revolving arm" nozzle assemblies for the purpose of reducing the required number of nozzles for a specific coating job.

Included in the controlling factors related to equipment and materials are nozzle design (opening size), pressure (liquid), and viscosity of the fluid (paint).

The importance of proper draining

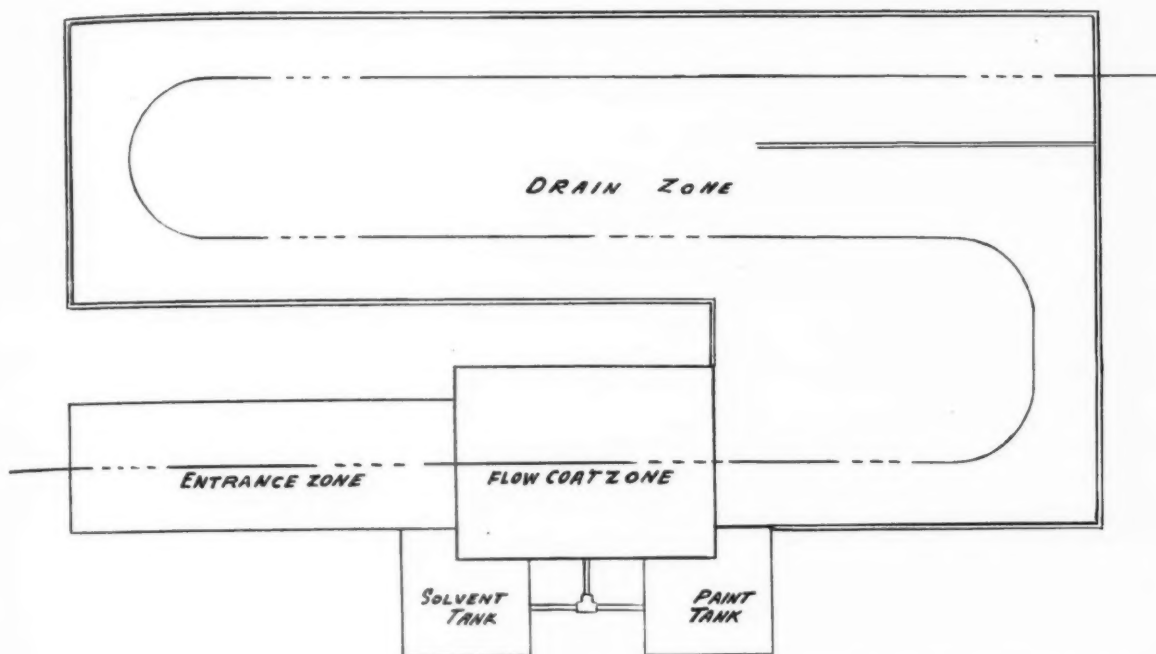
The early applications for flow coating provided for draining the excess paint from the parts in the open air, or in a closed ventilated area.

Some of the more recent installations provide for an initial draining period in a vapor laden atmosphere. In many cases, this initial drain in solvent laden atmosphere need only provide for a few minutes draining time. The rest of the drain time may be in room atmosphere.

The "vapor drain" tends to give

Editor's Note:

A second article to follow will present examples of equipment and processing techniques as currently used in leading appliance manufacturing plants.



greater uniformity of film thickness from top to bottom of drain and to afford freedom from sags, blisters, runs, streaks, beads and other similar defects.

The length of the flow-coating chamber is a function of the size and shape of the parts, the conveyor speed, the hanging system and the production requirements.

Finish composition is important

Coating materials to be applied by flow coating must be formulated to withstand severe agitation and repeated aeration without development of excessive foam or occluded air, development of a "seedy" condition, excessive settling, excessive bodying, or the development of color float or streaking.

Materials must also produce adequate film thickness on the work at a low enough application viscosity to permit good drainage and to be free of excessive build-up on lower edges.

Consideration must also be given to preventing excessive evaporation of the solvent in the flow-coating chamber. This is one reason that baking finishes are adaptable, as a high boiling solvent can be used. (Solvents in the 400°F. boiling range). Air dry finishes often use large percentages of solvents with boiling points in the 200°F. range

(as an extreme case it can be readily seen that fast drying finishes such as lacquers do not lend themselves, because of lack of proper draining properties and excessive solvent loss.)

Variables requiring control

As in many developments of this type, to get optimum operating conditions in a plant suggests the engi-

neering of the equipment and the balancing of finish compositions to fit the product and production requirements. There are, however, a set of variables that may be expected which call for an established control system.

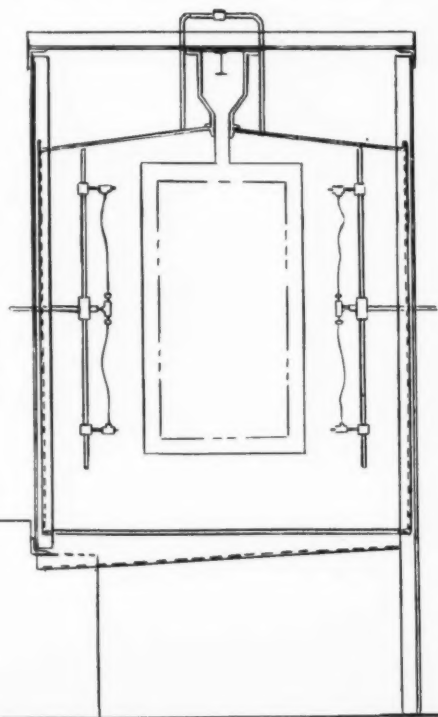
Pressure control is important, as too high a pressure tends to produce high flow rates with resulting exces-

Above: Plan view of a typical flow coating machine showing relationship of zones and comparative conveyor travel lengths.

Right: Cross section view of a typical flow coating machine showing ware travel in relation to flow coating nozzles which in this unit are mounted on rotary arms.

NOTE: The author acknowledges the cooperation of The R. C. Mahon Company, Detroit, and The Spra-Con Company, Chicago, producers of flow-coating equipment.

DRAWINGS COURTESY SPRA-CON



sive solvent losses, bubbling, and a tendency to cause instability in the material. Higher pressures also call for higher capacity pumps and an increased tendency to leakage in equipment.

Too low a pressure tends to leave uncoated or improperly coated areas on the work.

Pressures of from 5 to 25 pounds are in common use.

Viscosity that is too high tends to produce a "lazy" flow of the material on the parts, which in turn often results in sags, beads, blistering and other defects normally associated with excessive film thickness. Higher pressures may also be required to produce the desired flow rate. (Solvent consumption is reduced but it is considered that the attendant disadvantages outweigh this economic advantage.)

Too low a viscosity results in excessive solvent loss and inadequate film thickness.

Using a No. 4 Ford cup, a normal viscosity would read from 14 seconds for some materials to 25 seconds at operating temperature for other materials.

Temperature control is critical,

for too high a heater temperature tends to cause excessive solvent loss and may cause instability in some types of coating materials.

Lower operating temperatures will of course reduce solvent loss. Too low a temperature will, however, require the use of excessive solvent to maintain proper viscosity thus producing inadequate film thickness. In some materials this may also cause instability.

Temperatures of from 60° to 100° F. are in common use. Some applications favor the upper range of from 80° to 100° F.

Material cleanliness is of course important and calls for a few simple precautions in equipment and handling.

Adequate straining must be provided to remove any foreign particles rinsed from the work by the flow-coating action.

Drain pans are normally equipped with $\frac{1}{8}$ " mesh strainers. Disposable filters (80 to 120 mesh) should be placed at some point between the drain pans and the pressure feed.

Some operators favor large area gravity feed filters on strainers ahead of the reservoir. Others favor filters

placed on the discharge side of the pump so that the pressure applied makes the use of smaller area filters feasible.

As mentioned previously, flow-coating machines equipped with separate tanks for paint and solvent and with proper controls can be easily cleaned when required by "flushing" the entire system with solvent.

When this provision is not made in the equipment engineering, the paint must be drained back into the reservoir by gravity. If equipment is not used continuously it may be necessary to use air hammers or to dismantle the piping to completely clean the system.

Current applications

To repeat, the fundamental principle of flow coating has been in use for years. In addition to farm implements it has been used in the finishing of auto and truck frames, lawn and theater furniture, and building structurals.

More recent developments in materials have made it possible to apply some primers and enamels in the home appliance and allied metal products field.

Principal uses at present in the appliance field are for applying prime coats to the home laundry equipment, refrigerator parts, etc., referred to earlier.

In addition, it has been proved possible to flow coat enamel (finish coat) on parts that do not require the close inspection to which the exterior surfaces of home appliances are subjected. For instance, plate-type condensers for the refrigerator industry, range frames, etc. are being successfully finished.

Why flow coat?

Some of the conditions that are causing organic finishing departments to use or study the process include:

1. When prime coat production schedules call for greater speed than can be attained by dipping.
2. When hanging pattern of ware on conveyor prohibits dipping (sometimes flow coating is possible).

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RED IS RED, BLACK IS BLACK, AND BLUE IS BLUE—
BUT MIX THEM LIKE YOU DID TODAY AND YOU ARE THROUGH!

PERMA-VIEW means "added sales" of CROWN ranges

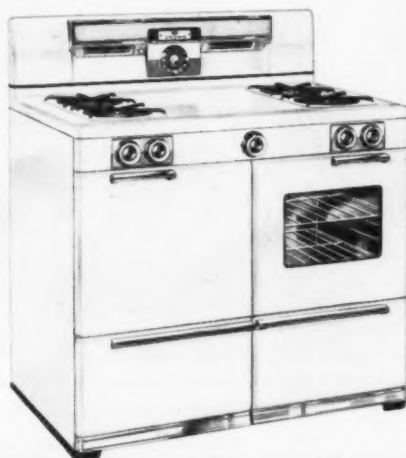
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PERMA-VIEW is a top sales feature for an increasing number of range manufacturers. Let our engineering department show you how easily PERMA-VIEW can be adapted to your range doors. Phone or write today.

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New Supplies and Equipment

D-10. Corrosion-resistant clamp

A new line of hose clamps are available in six sizes ranging from 1/2 inch to 2 inches. The clamping band is made of 26 gauge 1/4 hard stainless steel, while the "ears" are made of 18 gauge stainless. According to the manufacturer, there is no possibility of corrosion since the complete unit, including the nut and bolt, is made of stainless steel.

D-11. Continuous quenching unit for heat treating metal parts

A new quenching-and-conveying unit has been designed for continuous heat-treating of individual pieces. The oil in the tank is recirculated and cooled. A metal belt allows the quenched parts to drain as they move up an inclined conveyor, which is driven by a self-contained power unit. Cleats or flights can be attached. Over-all dimensions: length, 8 feet; width, 2 feet; height, 4 feet. Larger quench-conveyors are available for larger, heavier parts.

D-12. Safe method of pouring acids

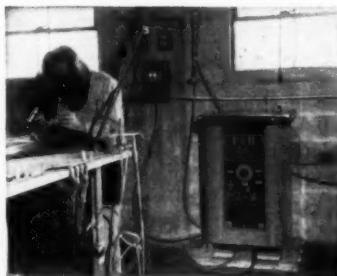


A new carboy tilter with pouring spout assures a safer, faster and easier method of pouring acids and other liquids from carboys. The air vent pouring spout offers a smooth flow of acids without spurts or splashes. Made of acid-resistant rubber and plastic tubing for extra longer life, the spout has a flow capacity of five gallons per minute.

More Information

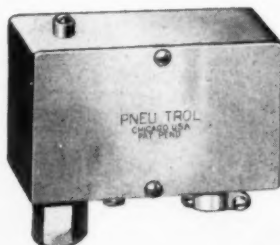
For more information on new supplies, equipment and literature reviewed here, fill out the order form on page 59, or write to us on your company stationery.

D-13. Inert gas welding equipment



This type of inert gas welder is said to have increased aluminum window production in a Florida plant by 70%. Formerly, arc welding was the method of fabrication. The windows had to be degreased before welding, followed by sanding and polishing operations. Recently the firm switched to an inert gas welder. The benefits over the former method were said to include a saving of 70% in time alone, and a substantial decrease in cost per unit.

D-14. Time delay control switch



Time Delay Switch is compact
3 7/8" x 2 3/8" x 1 3/8".

A simple, positive, low-cost time delay control switch for electric solenoid valve controls used with air or hydraulic cylinders, which permits time dwell from 1/4 to 10 seconds, has been developed. Small size permits it to be mounted near the mechanical stop without interfering with machine movement. The switch auto-

matically resets itself after each actuation.

The new switch is being used to control machine dwell for spinning, blanking, spot-facing, drilling, and tapping operations. Process work, such as burnishing, coating, quenching, dipping and dwell for fixture loading and unloading on high production operations are other applications of the switch.

D-15. Portable electric impact wrench

A versatile tool has been developed for applying and removing screws, studs and nuts—for nuts running up to 1/2 inch bolt size. This portable electric impact wrench will also drill, tap, ream and extract broken cap-screws or studs plus drive wood augers, hole saws and wire brushes quickly and effectively. A new pistol grip and trigger switch allows better control and instant response.

D-16. High-velocity air filter



A new high-velocity unit air filter is made of corrugated strips of fine mesh wire in which the corrugations taper so that when two strips are placed together they form a series of pyramid-shaped pockets. The small ends of the pockets are closed to the air flow to eliminate any open air passages through the media.

These filters are designed to operate at velocities up to 500 fpm and maintain a uniformly high cleaning efficiency over a wide range of air velocities. They can be serviced in the conventional way with washing and charging tanks or reconditioned by washing out the accumulated dust with a hose and spraying with filter adhesive. Bulletin issued free.

D-18. New electric chain hoist

Recently developed as an economy unit for efficient, fast action lifting, a new electric chain hoist applies modern handling methods to all types of handling operations. Available in



1/4, 1/2 and 1-ton capacities, this hoist puts miscellaneous lifting tasks on a paying basis, cuts expenses by saving time and effort. Designed for hook suspension, it is adaptable for trolley mounting. The entire gear train is enclosed in an air-tight case and operates in an oil bath.

D-19. Chemical ingredient for corrosion resisting coatings

An improved chemical now being used in coatings has come out of industrial laboratories as the result of recent research. The new material (R-103), technically referred to as an intermediate, is used as an ingredient in coating formulations to impart outstanding alkali and acid resistance. It is claimed that ordinary steel chemical processing equipment coated with a finish containing the new material can be substituted in many applications for expensive and hard-to-get alloys. Finishes for the interiors of metal drums can be made that are highly flexible and because of their chemical resistance, give

finish

steel drums longer life. (Photo shows how R-103-coated half of metal sheet



resists corrosive chemicals poured on it.)

D-20. Midget blast cleaning unit

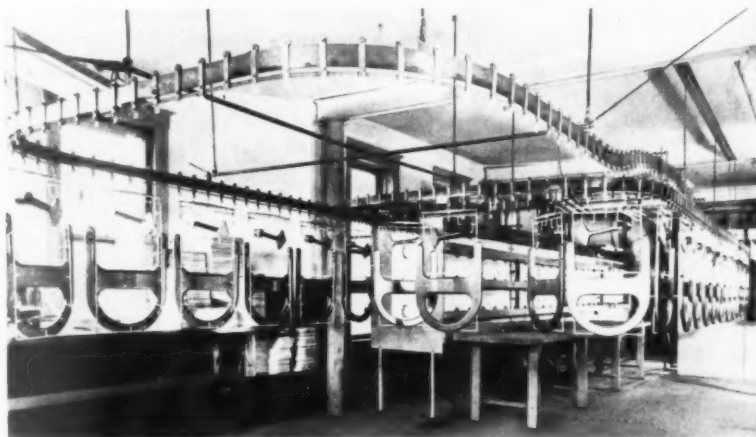
A new midget unit for liquid blast cleaning utilizes a blast chamber 16 inches in diameter. It can be used for occasional work, small parts and experimental use. Some uses include:

die and mold polishing after heat treatment; precision part polishing; surface treatment better to hold light lubricating oil films; preparation for



plating; tool and fixture maintenance and cleaning; cleaning of parts which function at high temperature; and stain and light scale removal.

D-21. New conveyor can be set up like "erector set"



A new lightweight conveyor is a packaged unit that can be erected and taken apart like the well-known "erector set." It is pre-engineered and was developed to meet the specific needs of both large and small manufacturers to convey relatively light parts. The monorail type conveyor can be operated as an over-

head, bench, or even portable conveyor system. The weight of the conveyor is approximately 3 lbs. per foot, including rail, chain and hangers. It has a carrying capacity of approximately 25 lbs. per foot. No super structure or handling equipment is said to be required for installation.



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Studies on fishscale of porcelain enamel

by Ikutaro Sawai, Megumi Tashiro AND Tadashi Yasui

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finish

In order to produce fishscales artificially, the authors treated steel plate, whose one side was coated by different kinds of enamels, by sulphuric acid. The volume of hydrogen, which is liberated at the enameled side by fishscaling, was measured by the replacement of mercury. Tests were made with ground coat, antimony and titanium cover coat applied over ground coat, each with different application weight.

The results obtained were as follows: (1) For all types of enamel, the volume of hydrogen evolved by single fishscaling increases with increased application weight in the following manner: 0.1 cu. mm. for 4 gm. per sq. dm., 1.2 cu. mm. for 6 gm. per sq. dm. and 2.4 cu. mm. for 8 gm. per sq. dm. No effects of types of enamel on the volume of hydrogen were found. (2) The fishscale produced has the shape of an inverted frustum of a cone, the small base of which is attached directly to the iron base. The ratio between its height, radii of large and small bases was 1 : 5.7 : 2.3 and was independent of the size of the fishscale, and the types and application weights of enamel. (3) The pressure of hydrogen necessary for producing a fishscale was calculated and found to be always about 110×10^6 dyne per sq. cm., irrespective of the types and application weight of enamel. (4) Overfire reduces the resistance to fishscale.

I. INTRODUCTION

Although a fishscale is one of the most serious defects in the practice of porcelain enameling, little system-

atic research had been made before the so-called "hydrogen theory" was presented by C. A. Zapfe and C. E. Sims.¹ The hydrogen theory, which postulates that the basic cause of this fact is the evolution of hydrogen absorbed in the steel plate, was later supported by W. W. Higgins.² Recently, standing on the hydrogen theory, the mechanism of the occurrence of fishscale has been thoroughly studied by J. H. Keeler, P. K. Chu and H. M. Davis³ and also by E. E. Bryant, B. J. Sweo, C. E. Miller and M. L. Simmons.⁴

As it is well known that hydrogen passes through iron, it is not difficult to make an arrangement to produce fishscale artificially and measure the

volume of hydrogen for each fishscaling or to calculate the necessary pressure to burst off the enamel layer.

The present article contains the results of our experiments on the artificial fishscaling.

II. EXPERIMENTAL PROCEDURE

Steel disks 50 mm in diameter and 0.56 mm thick were cleaned by normal acid treatment and enameled on one side. Three kinds of enamel frits were used for the experiments, i.e., (1) cobalt bearing ground coat, (2) antimony cover coat, and (3) titanium cover coat frit. The chemical composition of the steel plates and the batch composition of frits are given in Tables 1 and 2. These types

Table 1

C	Si	Mn	P	S	Cu
0.06	0.05	0.44	0.06	0.04	0.32

Table 2

	Ground-coat (%)	Antimony cover-coat (%)	Titanium cover-coat (%)
Feldspar	29.0	27.9	4.0
Quartz	16.5	18.0	38.7
Borax	29.2	19.6	28.6
Soda ash	11.7	8.6	—
Soda niter	3.4	7.3	3.1
Fluorspar	6.1	3.9	—
Sodium silicofluoride	2.7	7.8	—
Cryolite	—	—	6.5
Zinc oxide	—	0.5	0.8
Antimony oxide	—	6.4	—
Sodium antimonate	—	—	0.2
Titanium oxide	—	—	12.2
Aluminum hydroxide	—	—	1.0
Magnesium carbonate	—	—	3.4
Whiting	—	—	1.5
Cobalt oxide	0.5	—	—
Nickel oxide	0.4	—	—
Manganese oxide	0.5	—	—
Mill Addition	7% Clay 0.3% Ammonium carbonate	7% Clay 4% Tin oxide 0.1% Magnesium carbonate	5% Clay 1% Titanium oxide ¼% Potassium carbonate ⅛% Sodium nitrite

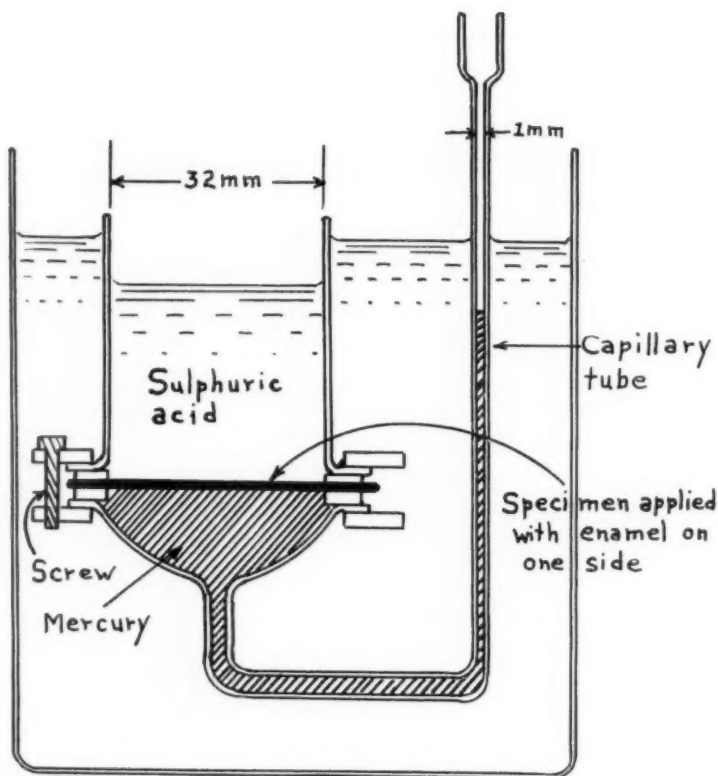


Fig. 1

of the ground coat and the antimony cover coat are used generally in Japanese enamel factories.

Determination of volume of hydrogen evolved by fishscaling

The apparatus shown in Figure 1 was used to determine the volume of hydrogen which, after diffusing through steel plate, burst through the reverse enamel layer. Specimen was placed between two glass cylinders,

so that mercury in the lower cylinder was in direct contact with the enameled surface. After assembling, the whole system was put in a water bath, which was kept at 75° C. After the head of mercury column stayed still, 10% sulphuric acid, which had been previously heated to 72° C., was put into the upper glass cylinder. A part of hydrogen, generated by the reaction between sulphuric acid and iron, diffused through the steel plate

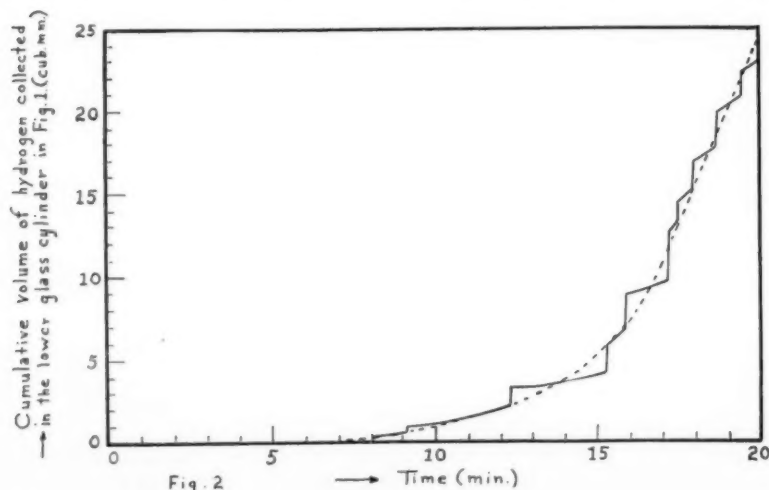


Fig. 2

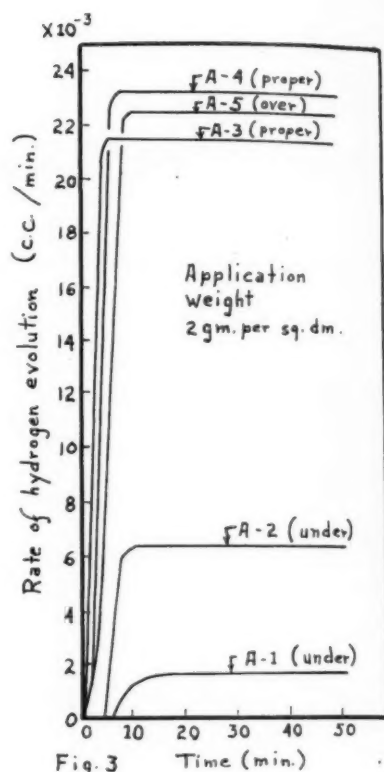


Fig. 3

and burst out at the reverse enameled side. The movement of the head of mercury, which corresponds to the volume of hydrogen collected at the enamel-mercury interface, was measured by a micrometer microscope. The temperature of sulphuric acid was kept constant at $72 \pm 0.5^\circ \text{C}$.

III. ANALYSIS OF RESULTS

Characteristic feature of hydrogen evolution

An example of the results of the hydrogen evolution tests is shown by the full curve in Figure 2. The specimen used was one which had been enameled with ground coat. The application weight was 6.2 gm. per sq. dm. The abscissa represents the time measured immediately after sulphuric acid was poured into the upper glass cylinder, and the ordinate the cumulative volume of hydrogen collected in the lower glass cylinder.

The authors have observed that the evolution of hydrogen occurs discontinuously, and, furthermore, the latter was always accompanied by fishscaling. These phenomena can be explained by the intermittent breaking

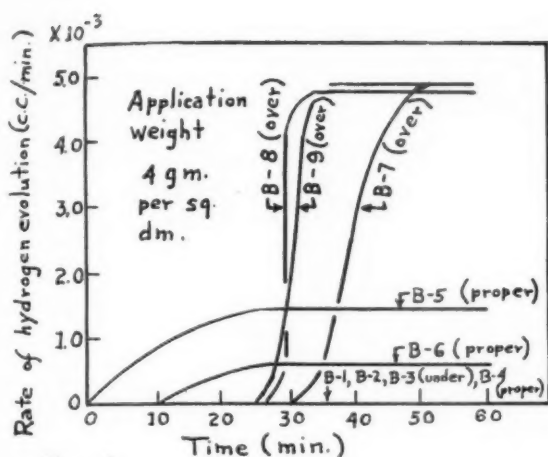


Fig. 4

off of the enameled layer by the strong pressure of hydrogen which accumulates at the cavities of steel-enamel interface until its pressure just balances with the bursting strength of enamel at the corresponding spot. Faint metallic noises, which could generally be heard at the time of bursting, give strong support to this explanation. After the fishscales were already produced, the hydrogen was able to pass freely through the scars. The gradual rises of the curve between the sudden rises can be attributed to the free evolution of hydrogen through the scars.

In order to know the tendency of the increase in the cumulative volume of hydrogen, the dotted line was drawn in the midst of the zigzag full line as shown in Figure 2 and from the tangents of this dotted line the rate of increase in the cumulative volume of hydrogen was obtained.

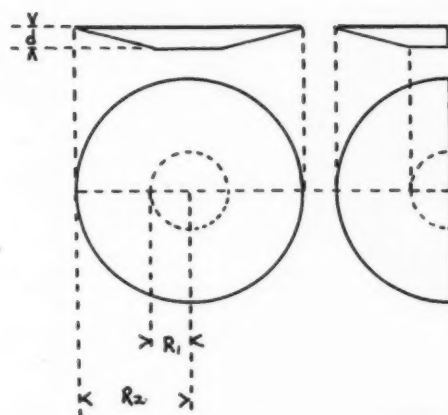
Naturally the rate of increase of the cumulative volume of hydrogen depends upon the number of fishscales in unit time and also upon the size of fishscales. Therefore, the rate of increase of the cumulative volume of hydrogen will become an index of the frequency of fishscaling under the experimental conditions.

Effects of the degree of firing

To make clear the difference in the degree of fishscaling for under-, proper- and over-fired enamel, the authors prepared three kinds of specimens which correspond to the aforementioned three different degrees of firing, and subjected them to the hydrogen evolution tests. To obtain the so-called "proper-fired" enamel, the specimens were fired until the color of the enameled surfaces just turned into greenish cobalt from the pure cobalt color of the "under-fired"

enamel. For obtaining the "over-fired" enamel the specimen was fired until copperheads appeared. For the present experiments the specimens were applied only with the ground coat whose weight was about 2 or 4 gm. per sq. dm.

The curves in Figures 3 and 4 represent graphically the difference of the rate of the evolution of hydrogen from specimens fired under different conditions. The rate of evolution of hydrogen increases rather rapidly in the beginning and then becomes constant. This "constant rate" differs in fair amount according to the degree of firing and also to the application weight. The rate diminishes with the increased weight of application, and, moreover, the under-fired specimens (A-1, A-2 in Figure 3; B-1, B-2, B-3 in Figure 4) give the minimum rate. The "over-fired" specimens (A-5 in Figure 3; B-7, B-8,



(a) Fig. 5 (b)

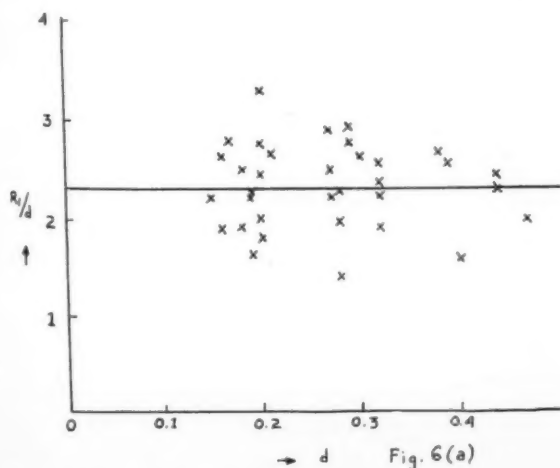


Fig. 6(a)

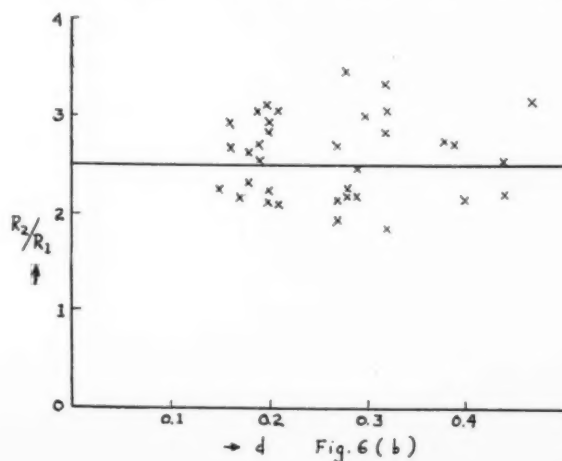


Fig. 6(b)

Table 3. Volume of hydrogen evolved at single fishscaling.

Total application weight	4 gm. per sq. dm.		6 gm. per sq. dm.		10 gm. per sq. dm.	
Specimens	Hydrogen volume (cub.mm.)	Frequency of occurrence (%)	Hydrogen volume (cub.mm.)	Frequency of occurrence (%)	Hydrogen volume (cub.mm.)	Frequency of occurrence (%)
Specimens enameled with the ground coat (4, 6, 10 gm. per sq. dm.)	0 - 1.0	60	0 - 1.0	15		
	1.0 - 2.0	30	1.0 - 2.0	75		
	2.0 - 3.0	10	2.0 - 3.0	10		
	3.0 <	0	3.0 <	0		
Volume of hydrogen for maximum frequency	0 - 1.0 cub. mm.		1.0 - 2.0 cub. mm.			
Specimens enameled with the ground coat (2.0 gm. per sq. dm.) and the antimony cover coat (2, 4, 8 gm. per sq. dm.)	0 - 1.0	75	0 - 1.0	30	0 - 1.0	0
	1.0 - 2.0	20	1.0 - 2.0	65	1.0 - 2.0	10
	2.0 - 3.0	5	2.0 - 3.0	5	2.0 - 3.0	10
	3.0 <	0	3.0 <	0	3.0 - 4.0	40
					4.0 - 5.0	20
Volume of hydrogen for maximum frequency	0 - 1.0 cub. mm		1.0 - 2.0 cub. mm		3.0 - 4.0 cub. mm	
Specimens enameled with the ground coat (2.0 gm. per sq. dm.) and the titanium cover coat (2, 4, 8 gm. per sq. dm.)	0 - 1.0	85	0 - 1.0	40	0 - 1.0	5
	1.0 - 2.0	10	1.0 - 2.0	55	1.0 - 2.0	30
	2.0 - 3.0	5	2.0 - 3.0	5	2.0 - 3.0	50
	3.0 <	0	3.0 <	0	3.0 - 4.0	15
Volume of hydrogen for maximum frequency	0 - 1.0 cub. mm		1.0 - 2.0 cub. mm		2.0 - 3.0 cub. mm	

B-9 in Figure 4) show the maximum rate, and this tendency can be clearly observed with the thicker application. Hence we can conclude that the "under-fired" enamel is the least likely to fishscale. Indeed the specimens B-1, B-2, B-3 could withstand 60 minutes experiment without indicating any trace of fishscaling. On the other hand, "over-firing" seems to reduce the resistance to fishscale.

Volume of hydrogen evolved by fishscaling

In order to find the volume of hydrogen necessary to produce single fishscale, the authors measured the volume of hydrogen at every "jump" of cumulative hydrogen volume. At first, the four kinds of specimens were prepared which correspond to the different application weights of the

ground coats, i.e., 2.0, 4.0, 6.0 and 10 gm. per sq. dm.

Antimony or titanium cover coat were applied to the specimens which had been enameled with 2 gm. per sq. dm. of ground coat. The application weights were 2, 4, 8 gm. per sq. dm.

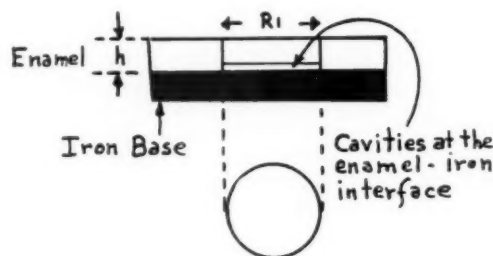


Fig. 7

Thus we obtained three groups of specimens as shown in Table 3. For each case, the deviation of the appli-

cation weights was within 10%. The firing temperature of ground coat was 840° C., for antimony cover coat 820° C. and for titanium cover coat was 830° C. The time of firing was "proper" for all specimens. The results of the tests are shown in Table 3. For the specimens which have the enamel layer thinner than 4 gm. per sq. dm., the distance of the jump of the curves became so small that the measurements of its distance were almost impossible.

The preparation of the specimens applied with the ground coat of more than 10 gm. per sq. dm. were difficult, because the ground coat, which generally has a smaller expansion coefficient than the cover coat, is very liable to crack when the application weight exceeds a certain limit. Therefore, the results of the experiments for such extreme cases were omitted from the figures in the Table.

If we arrange the volume of hydrogen due to single fishscaling in ascending order and classify them into groups of equal volume interval, say 0-1.0, 1.0-2.0 cu. mm., etc., then we will find that the frequency in percent of fishscale which belongs to a certain volume interval is remarkably higher compared with that of other intervals. The results are given in Table 3. It is seen that the maximum frequency shifts to larger volume interval with the increasing thickness of enameled layer, although the type of enamel does not affect the position of maximum frequency.

The shape of a fishscale

After the hydrogen evolution tests were carried out, the specimens were taken out of the apparatus and the fishscales produced on the surface were then observed under the micrometer microscope. Some of the fishscales had chipped off and the others remained at their original positions. The latter could be removed by heating the specimens repeatedly up to about 300° C. The caves had generally the shape of an inverted frustum of a cone, or half of one, as

shown in Figures 5 (a) and (b). Its depth, and the radii of the small and large bases, were measured by microscope. The results are shown in Table 4.

The authors observed some fishscales of irregular shapes, which had the oval base. The values of R_1 , R_2 and d in Table 4 were obtained from the results of our observations of the fishscales of regular shape whose larger diameter is equal in every direction within the deviation of 10%. The ratio of the radius of the small base R_1 and the depth of d are plotted against the depth d in Figure 6 (a). The ratio of the radii of the large and small bases, $R_2 : R_1$, are also plotted against the depth in Figure 6 (b).

The results of Figures 6 (a) and (b) indicate that the ratios of $R_1 : d$ and $R_2 : R_1$ are almost constant, 2.3 and 2.5 respectively, and are independent of the thickness of the enamel layer. Also the type of enamel does not affect these ratios. Therefore the ratio of $R_1 : R_2 : d$ becomes 2.3 : 5.7 : 1. It is interesting to know that the shape of a fishscale is not affected by the thickness and the types of the enamel.

Pressure of hydrogen necessary for producing a fishscale

From the facts discussed in the preceding paragraph it became clear that fishscale is caused by the pressure of hydrogen which accumulates at the cavities of the enamel-iron interface. The authors have attempted to calculate the pressure of hydrogen which is necessary for the bursting off of a part of enamel layer as a fishscale. Although the actual shape of fishscale is an inverted frustum of a cone, a rough estimate can be made by using the following assumptions by which we can bring the problem to a simple example of dynamics. As shown in Figure 7 we assume that (1) fishscale has the shape of a disk having diameter of R_1 , (2) fishscale is caused by the equally distributed pressure of hydrogen which acts on one side of the disk, and (3) the disk is held rigidly around its circumference.

Under these conditions, the maximum stress is introduced at the cir-

cumference of the disk, and is expressed by the equation $q = \frac{3}{4} (R_1/h)^2 P$, in which q is the tensile stress at the circumference of the disk, R_1 the radius of the disk, h the thickness of the disk, and P the pressure of hydrogen. The fishscale occurs when the value of the tensile stress, q , becomes equal to that of the maximum tensile strength of the enamel glass, i.e. about 700×10^6 dyne per sq. cm. Moreover, as described above, the ratio of R_1 and $h (= d)$ is always about 2.3, which is independent of the size of the fishscale and the type of enamel. Substituting these values in the preceding equation, the pressure of hydrogen necessary for producing a fishscale can be obtained, as $P = 113 \times 10^6$ dyne per sq. cm.

1. C. A. Zapfe and C. E. Sims, "The Relation of Defects in Enamel Coatings to Hydrogen in Steel," J. Am. Ceram. Soc., 23, 189-219 (1940).

2. W. W. Higgins, Proc. Porcelain Enamel Institute Forum, Sixth Forum, October, 1940, Page 71.

3. J. H. Keeler, P. K. Chu and H. M. Davis, "Classification and Definition of Delayed Defects," Paper Presented at N. Y. Meeting, Amer. Ceram. Soc. (1950).

4. E. E. Bryant, B. J. Sweo, G. E. Miller and M. L. Simmons, "A Study of Fishscale Produced by Induction of Hydrogen into Enamelled Iron," Paper Presented at N.Y. Meeting, Amer. Ceram. Soc. (1950).

Adherence

by Nelson H. Kehl*

See that little dendrite
Sticking out of steel.
Some think that that's the
reason
For glass-to-metal seal.

The theory of adherence
Is of great importance now.
All enamelists make use of it,
But few know why or how.

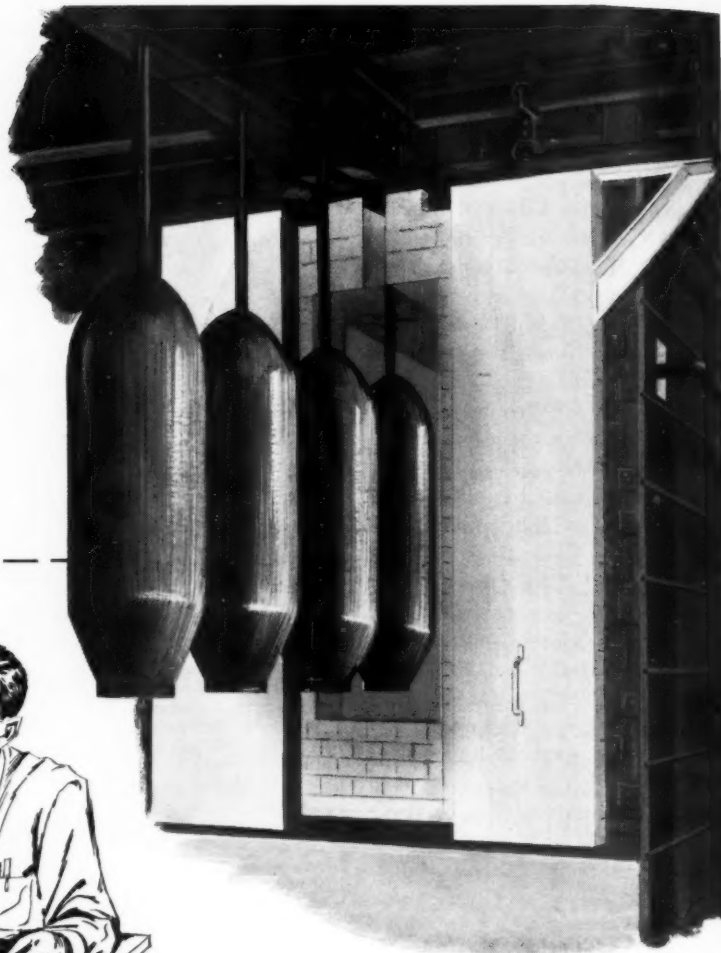
Just why enamels stick
Is driving good men nuts.
They attribute it to many
things—
I think it's just plain guts.

*Battelle Memorial Institute Staff

Table 4. Shape of a fishscale.

	Total application weight (gm. per sq. dm.)	R_1 (mm)	R_2 (mm)	d (mm)
Specimens enameled with the groundcoat (1.6 gm. per sq. dm.)	4	0.56	1.70	0.21
		0.56	1.17	0.21
		0.49	0.95	0.20
		0.34	0.79	0.18
		0.31	0.79	0.19
		0.66	1.46	0.20
	6	0.67	1.79	0.27
		0.61	1.72	0.32
		0.71	2.35	0.32
		0.64	1.38	0.28
Specimens enameled with the groundcoat (2.0 gm. per sq. dm.) and the antimony covercoat (2.4, 8 gm. per sq. dm.)	4	0.42	1.13	0.19
		0.40	1.13	0.20
		0.36	1.04	0.20
		0.30	0.87	0.16
	6	0.79	2.35	0.30
		0.55	1.23	0.28
		0.60	1.27	0.27
		0.75	2.27	0.32
		0.82	1.50	0.32
	10	1.00	2.70	0.39
		1.01	2.76	0.38
		1.03	2.18	0.40
		1.01	2.54	0.44
Specimens enameled with the groundcoat (2.0 gm. per sq. dm.) and the antimony covercoat (2.4, 8 gm. per sq. dm.)	4	0.43	1.30	0.19
		0.42	1.16	0.16
		0.47	1.01	0.17
		0.45	1.18	0.18
		0.55	1.16	0.20
	6	0.33	0.74	0.15
		0.49	1.68	0.28
		0.80	1.98	0.29
		0.85	1.85	0.29
		0.79	1.51	0.27
	10	0.93	2.93	0.47
		1.08	2.39	0.44

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operations efficient and economical. *89% of all porcelain enameling furnaces in the country were Ferro engineered and installed.* Our knowledge of these furnaces and broad experience in converting them to heat-treating systems is at your disposal.

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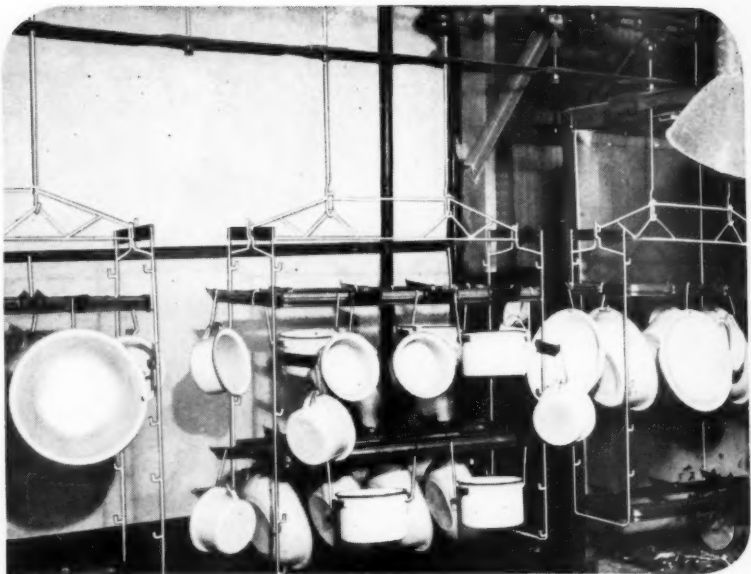
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Then they changed over to fabricated wrought-Inconel® tools. The new tools weighed only 33 pounds, yet they carried the same load of 63 pounds.

The tools have been in use a year and a half. During this period, C. H. Kehl, Chief Engineer at Moore Enameling, compiled some interesting data.

On Gas Consumption, Mr. Kehl wrote:

"No. 3 furnace with heavy tooling, based on five working days during February, 1950—148,767 cu. ft. was average consumption per day.

"Same furnace with new light fabricated tooling, based on five working days in each of the months of January, February and March, 1950—averaged daily consumption 93,320 cu. ft. This shows a saving of approximately 37%..."

About Furnace-Operating Temperatures:

"It was necessary to maintain a hot-zone temperature of from 1580° to 1590°F. with heavy tooling, as compared to 1535°F. now required with the new light tooling. The chain speed is the same as with heavy tooling.

"We had no way to determine the comparative combustion chamber temperature gradient between combustion chamber and the inside of the furnace, but would estimate that the combustion chamber temperature was at least 200° lower than required when the heavy tooling was used."

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ACS Enamel Division to hear important technical papers

MORE than 135 technical papers are scheduled for presentation during the sessions of the American Ceramic Society's eight divisions at its 53rd annual meeting in Chicago, April 22-26, at the Palmer House. The papers were arranged by the program committees of the various divisions. For the Enamel Division, E. E. Howe, Chicago Vitreous Enamel Product Co., is program chairman.

Symposium on adherence—L. S. O'Bannon, Battelle Memorial Institute, a review of the literature; J. H. Healy and A. I. Andrews, University of Illinois, on the cobalt reduction theory (see "Cobalt Reduction Theory of Sheet Iron Enamels," December 1950 finish), and the properties of the elements of the third, fourth and fifth series of the periodic table as related to adherence promotion; J. F. Miller, Mellon Institute, on the effect of oxides of arsenic on adherence; and W. N. Harrison, National Bureau of Standards, on the use of radioactive isotopes as a means of studying adherence.

Enamel defects—R. F. Patrick, Pemco Corporation, on defects developed by freezing and thawing; H. D. Bowsher, General Electric Co., the relation of bubble structure to spalling; M. K. Blanchard, A. O. Smith Corp., islanding; D. G. Moore, National Bureau of Standards, on use of heavy hydrogen in tracing the source of defect-producing hydrogen in steel; and H. N. Staats, Magnaflux Corp., on the electrified particle inspection method for observing the character and behavior of cracks. (See "Studies on Fishscale of Porcelain Enamel" in this issue.)

Nickel—J. H. Keeler, Pennsylvania State College, on the role of nickel in enameling.

Titanium enamels—J. F. Lochridge, Ferro Enamel Corporation, on the fit of titanium enamels, as determined by warpage and expansiometering tests, compared to torsion and crossbend failures; M. D. Beals, Titanium Division of National Lead

Company, study of particle size of the opacifying phase in titania enamels; G. S. Douglas and J. M. Zander, Chicago Vitreous Enamel Product Co., findings on a study of applying titanium enamel directly to steel.

Others—D. G. Moore and J. W.

Pitts, National Bureau of Standards, on the use of ceramic coatings in aircraft exhaust systems to reduce corrosion and prevent carbon absorption; J. E. Cox and R. L. Cook, University of Illinois, on the use of nepheline syenite in enamels.

Enamel man heads Canadian Ceramic Society

William S. Craig, general manager, Stamped & Enamelled Ware Ltd., Hespeler, Ontario, was elected president of the Canadian Ceramic Society at that group's 49th annual meeting held recently in Montreal. H. C. Bates, Corning Glass Works of Canada Ltd., was named first vice president. Howells Frechette was re-ap-



WILLIAM S. CRAIG

pointed secretary, and L. C. Keith was named again to serve as assistant secretary-treasurer.

Officers of the Enamel Division were elected as follows: M. P. Durrant, Frigidaire Products of Canada Ltd., chairman; M. Reagan, Stamped & Enamelled Ware Ltd., secretary; and J. Crawley, Enamel and Heating Products, Ralph Kimpton, Moffats Ltd., R. F. McAllister, Ferro Enamels (Canada) Ltd., and F. A. Bidwell, Canadian Westinghouse, directors.

More than 40 enamelers were in attendance at the Enamel Division sessions at which the following papers were presented:

"The Effect of Sulphur Contam-

inated Dust on Titanium Enamels" by M. J. Bozsai, Ferro Enamel Corp., and J. Heather, Ferro Enamels (Canada) Ltd.; "De-Enamelling" by Graham Bell, Graham Bell Enamelling Co.; "Enamelling of Various Grades and Types of Metals" by Austin Kelly, Guelph Stove Co.; and "Tests and Testing Methods for Porcelain Enamel Finishes" by Eugene Bryant, Ferro Enamel Corp.

Guest speaker at the Society's general session was Brigadier W. Mavor, president, Ferro Enamels (Canada) Ltd., who discussed "Vitreous Enamel is International."

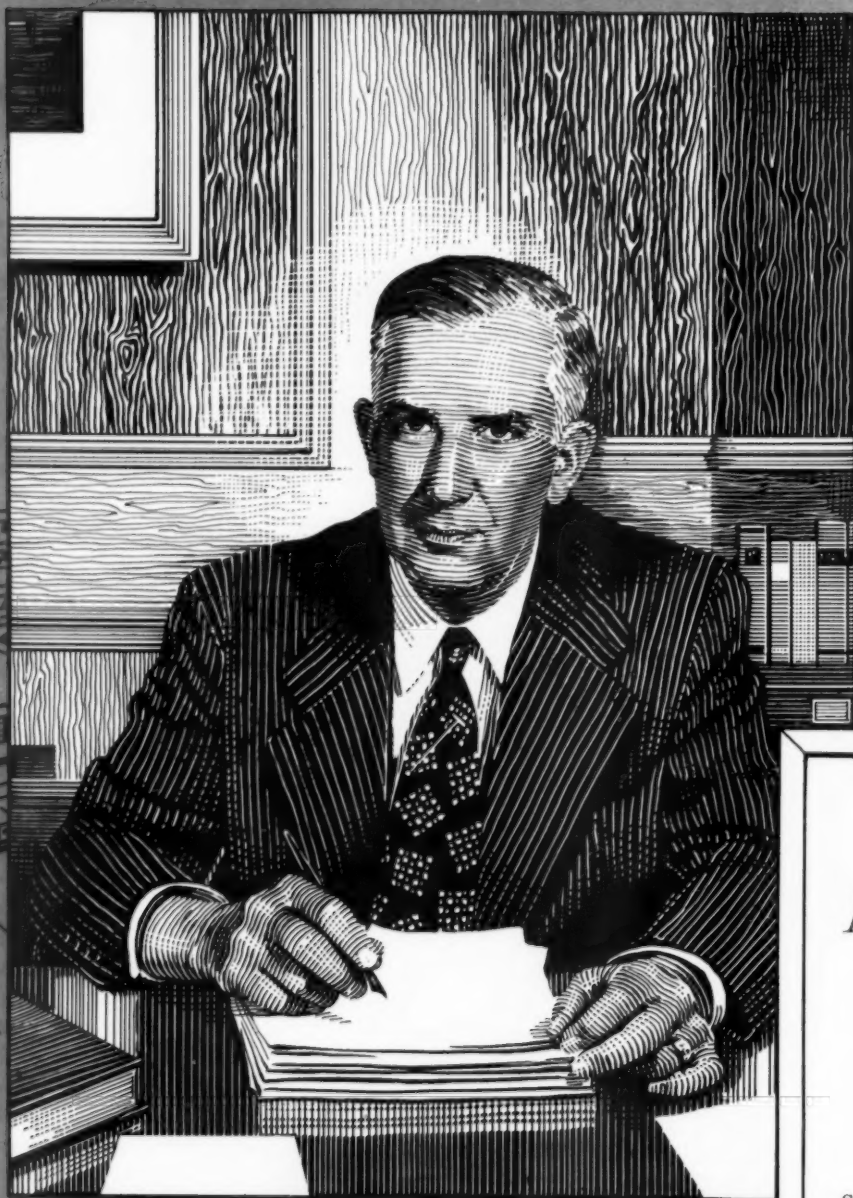
Mavor said that the industry was highly developed in the United Kingdom, where the enameling of cast iron both by wet and dry process is efficient and the equipment is modern.

Some of the most up-to-date equipment for vitreous enameling in Continental Europe is found in Sweden where one of the outstanding plants, in Stockholm, produces sheet steel bathtubs, said the speaker. South Africa had only two enameling plants in 1937, but since then five new plants have been installed. In Australia the industry has grown in proportion with the population of the southern Commonwealth country.

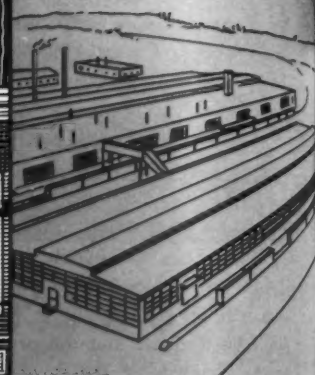
Mexico is a market where quantity is more essential than quality, with the industry located in Monterey and around Mexico City. Mavor said that enameling is developing through South America, with the most flourishing business in Brazil.

The date for the 50th annual meeting of the Canadian Ceramic Society was announced as February 11, 12 and 13, 1952, at Niagara Falls.

Whyd



W. R. GREER,
Vice-President, Pemco Corporation



MERIT AWARD

Pemco Corporation

GRANTED BY THE NATIONAL
BOARD OF GOVERNORS FOR
LEADERSHIP IN FORMULATION,
FACILITIES AND PROCESSES
IN THE CERAMIC INDUSTRY

AMERICAN
SOCIETY OF INDUSTRIAL ENGINEERS



OUTSTANDING PEMCO PRODUCTS IN USE ALL OVER THE WORLD!



**PORCELAIN
ENAMEL FRIT**



**CERAMIC
FRIT**



**PORCELAIN
ENAMEL COLORS**



**CERAMIC
COLORS**



**GLASS
COLORS**

Why did PEMCO win THE 1951 MERIT AWARD?

*"For Leadership in Formulation,
Facilities and Processes in the Porcelain
Enamel and Ceramic* Industry"*

"These words above, from the citation of the American Society of Industrial Engineers, are only part of the answer. Actually what did Pemco Corporation do to be singled out for this distinguished honor? What did the Board of Governors of this nationally-famed engineering body find in Pemco that it failed to find elsewhere? Leadership certainly, but something more than just leadership: the sense of responsibility which leadership entails . . . an impelling urge to pioneer new methods, to blaze new trails, to engage in unceasing research above and beyond the hope of material gain — seeking always to heighten the standards and increase the capabilities of the entire industry while improving the quality of its own products. For 40 years, Pemco has been moving forward on this broad front. The honor paid to it by the A.S.I.E. is graciously received . . . and Pemco pushes on, seeking new worlds to conquer for the increasing benefit of those who produce and those who use porcelain enamel and ceramic products!"

W.R. Green

"Always Begin with a Good Finish"

PEMCO CORPORATION

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BALTIMORE 24, MD.



*Manufacturers of "The World's Finest" PORCELAIN
ENAMEL AND CERAMIC FRITS; PORCELAIN ENAMEL,
CERAMIC AND GLASS COLORS; AND RELATED PRODUCTS

Only Pemco in its field
is authorized to use this
Approved Process Seal.

NEWS

ARTKRAFT GETS DEFENSE

ORDER FOR POWDER CANS

Artkraft Manufacturing Corp., Lima, Ohio, has received an initial order for 200,000 galvanized powder cans for the Bureau of Ordnance, and production will start sometime in April at the rate of 1000 a day, Morton L. Clark, president of Artkraft, has announced.

This initial defense order amounts to approximately \$1,000,000, and the company is also negotiating for other similar prime contracts, said Clark.

Defense work will not interfere with the company's civilian production of domestic refrigerators, beverage coolers and signs, which will continue in line with the ability to obtain raw materials, he added.

JANUARY LAUNDRY EQUIPMENT

SALES TOP JANUARY '50

Factory sales of home laundry equipment during January continued at levels above a year ago, it was announced by the American Home Laundry Manufacturers Association. Washers were up 16.5% above 275,576 units in January, 1950; dryers 63.8% ahead of 19,495; and ironers 21.1% greater than 20,300 in the comparison month of 1950.

TO SPEED PREFABRICATED

HOME PRODUCTION

Gunnison Homes, Inc., leading prefabricated housing manufacturer, has gone all-out in its efforts to supply defense housing, according to Gen. John J.

O'Brien, president of this U. S. Steel subsidiary. The company is discontinuing production of its highest priced line of Deluxe homes for the duration of the national defense emergency and hereafter will concentrate exclusively on its low-cost models.

While suspending production of the Deluxe homes, the company plans to produce 11,000 of the low-cost models during 1951, General O'Brien said, adding that these sell in the \$7,000 to \$10,000 price range, including the lot.

4,300,000 ELECTRIC WATER

HEATERS SOLD IN PAST 5 YEARS

More than 4,300,000 electric storage type water heaters were sold in the five years from 1946 to 1950 inclusive, says the Plumbing and Heating Industries Bureau. This compares with 750,000 for the six-year period from 1936 to 1941 inclusive prior to World War II.

RHEEM TO PRODUCE DEPTH

CHARGE CASES FOR NAVY

A Navy contract to manufacture depth charge cases has been awarded Rheem Manufacturing Co., C. V. Coons, vice president, has announced.

The company, producers of household appliances and steel shipping containers, will start work on the contract immediately at its Chicago plant, said Coons.

Depth charge cases were among the many ordnance items which Rheem manufactured for the Armed Forces during World War II. At one

time, the anti-submarine weapon was produced at three of Rheem's eight plants in this country.

NEW COOLERATOR VICE PRES.

The appointments of W. C. Conley, Jr., and S. W. Skowbo to vice president posts with The Coolerator Company were announced by Ward R. Schafer, vice president and general manager, at the 3rd annual "Coolerator Conclave."

MAGIC CHEF TRADE NAME

ON HEATERS, OIL STOVES

A complete line of American Stove Company products is now being sold under the Magic Chef trade name, according to Marc W. Pender, vice president in charge of sales. This includes the firm's full line of domestic gas ranges, commercial cooking equipment, gas and oil space heaters, and oil cook stoves.

The Quick-Heat line of gas and oil space heaters and the Quick Meal line of oil stoves, manufactured at the company's Lorain, Ohio, plant, are the two brands which now carry the Magic Chef label. The change is a consolidation move, preceded by the transfer of Lorain sales management to St. Louis headquarters last August.

NESCO NAMES SALES DIRECTOR

The appointment of Paul H. Hill as director of sales has been announced by Nesco, Inc. William P. Howlett, executive vice president, said Hill will assume over-all direction of sales in the housewares, electrical, and stove and heater divisions of the company.

MULLINS PLANT PROMOTIONS

Ben Kaul, former chief tool and die engineer at the Warren (Ohio) plant of Mullins Manufacturing Corp. has been named technical development engineer for Mullins, George E. Whitlock, president, announced recently.

Promotions of three other Mullins men were also announced by Frank M. Beauregard, vice president in charge of operations. Michael Theil

is now general superintendent of tools and dies at the Salem and Warren plants; Ralph L. Bradley, general superintendent of engineering, tool

design and estimating for both plants; and Andrew W. Arnold, superintendent of the Warren tool department.

ESTATE STOVE ACQUIRES WARD HEATER

The Estate Stove Company is expanding operations to the Pacific Coast with the acquisition of Ward Heater Company, Los Angeles manufacturer of floor furnaces. The announcement was made by Cecil M. Dunn, vice president and general manager of Estate, a subsidiary of Noma Electric.

Ward Heater, which was established some 41 years ago, will continue to manufacture its present heater line. Plans call for investment in

new equipment and increased capacity with a view toward adding to the Ward line some of the products now manufactured by Estate, at Hamilton, Ohio, plus new products to round out Ward's Summer operations, said Dunn who will head the new division.

The acquisition marks the second recent expansion of Estate facilities. Early in December, Estate acquired Toledo Desk & Fixture Co., Maumee, Ohio, manufacturer of kitchen cabinets and sinks.

over three days instead of four days, as originally planned, it was announced by Robert W. Otto, chairman, AGA General Convention Committee.

The convention will be held in St. Louis, Monday to Wednesday, October 15 to 17, with headquarters in the Kiel Auditorium, said Otto, who is also president of Laclede Gas Company, St. Louis.

PERFECTION STOVE HEAD RETIRES

L. S. Chadwick, since 1922 president and chairman of the board, Per-



fection Stove Company, has announced his retirement. He joined Perfection as a consulting engineer in 1912, when the organization was known as the Cleveland Foundry Company. In 1917 he was elected to the board of directors, and became president five years later.

The 76-year-old retiring president within the past two years led Perfection into the ranks of gas and electric range manufacturers, following 61 years during which the company's products were principally in the oil-burning field.

NEW PLUMBING FIXTURES FEATURE COLOR, VANITY LAVATORIES

What the plumbing and heating industries will be able to provide for new building and modernization in 1951 has been shown to the nation's builders. Builders' exhibits show glamorous plumbing fixtures in a variety of colors as well as automatic

CROSLEY BUILDING PLANT TO HANDLE DEFENSE WORK

The Crosley Division of Avco Mfg. Corp. has announced plans for the expansion of the Crosley plant in Richmond, Indiana, with the construction of a new building providing 211,200 square feet of manufacturing space.

John W. Craig, Avco vice president and Crosley general manager, said the space afforded by the new structure will be devoted entirely to the production of equipment for the Armed Forces. The manufacture of equipment for which the Air Materiel Command recently awarded Crosley

a contract will be centered at the new plant, he said.

Regarded as one of the most modern in the refrigeration industry, the Richmond plant has been the home of Crosley's Shelvador refrigerator production since 1937, and the company will continue to produce refrigerators at the maximum levels permitted by the availability of materials. Craig said. The new building, which is expected to be substantially completed by October 1, brings the total floor space of the Richmond operation to 979,000 square feet.

ALCOA PLANS FOR \$150,000,000 IN DEFENSE PROJECTS

Stockholders of Aluminum Company of America, at a special meeting in Pittsburgh in February, authorized the company to increase its indebtedness from time to time up to an aggregate total of \$500,000,000 outstanding at any one time. The previous limit was \$200,000,000.

The increase in authorized indebtedness was recommended by the board of directors in connection with the company's program for construction of new plants and facilities to supply aluminum for national defense requirements. It is estimated that such construction and installations may cost between \$130,000,000 and \$150,000,000, all or most of

which is expected to be financed through borrowings.

Roy A. Hunt, Alcoa president, also informed stockholders that company management has for some time been considering the listing of outstanding common stock on the New York Stock Exchange, and has now decided to proceed with such listing.

AGA REDUCES 1951 CONVENTION TO THREE DAYS, OCTOBER 15-17

In the interest of economy both in expense and manpower in light of the outlook of general conditions, the 33rd annual convention of the American Gas Association will be

heating equipment, including oil and gas burners, boilers, baseboard heating unit, convectors, radiators and panels.

New plumbing fixtures score high in eye appeal as manufacturers have gone all out for color with a wide range of soft pastels available for fixtures.

Bathtubs include rectangular and square designs, with seats at the end, at the side and on the corner. They have safe, flat bottoms and splash rims which make them neat shower receptors.

Vanity lavatories are a top feature, says the Plumbing and Heating Industries Bureau. These lavatories have abundant flat space for toilet articles and convenient drawers underneath. Many are encased in cabinets containing clothes hampers.

HASENZAHL TO ESTATE'S NEW MAUMEE, OHIO, PLANT

Walter Hasenzahl has been appointed assistant general manager of Toledo Desk and Fixture Company, of Maumee, Ohio, according to Cecil M. Dunn, vice president and general manager, The Estate Stove Company, a subsidiary of Noma Electric Corp.



Toledo Desk and Fixture, manufacturers of kitchen sinks, cabinets and the Lavanette, was acquired by Estate in December.

Hasenzahl joined Estate in January, 1947, as an industrial engineer. In 1949, he was appointed national service manager, and for the past

year served as assistant to the general manager. Prior to joining the Estate organization, he had been assistant to the vice president in charge of manufacturing, Master Electric Corp., Dayton, Ohio. Before the war, for three years he operated his own

business as a management engineering consultant. In military service, he attained the rank of captain, having charge of repair shops for the Air Service Command in the Pacific Theatre.

TAPPAN ADVERTISING, RESEARCH PROGRAMS ARE LARGEST IN COMPANY'S HISTORY

Urging its dealers, "In times of emergency, don't forget your public, or let it forget you," The Tappan Stove Company, Mansfield, Ohio, has revealed plans for launching the largest advertising program in the history of the company, it was announced by P. I. Berno, director of merchandising. The program breaks in April.

"We are going ahead with our advertising plans even though some of the Tappan production facilities already have been diverted from ranges to the manufacture of defense ma-

teriel . . . expenditures for national advertising and for research have not been curtailed—they are the largest in Tappan history . . .", Berno stated.

"We know from experience that it's good business to advertise. During World War II, Tappan was the only range manufacturer to consistently carry on a national magazine advertising program. Now is a time when constructive merchandising can protect the economic strength of our country as well as preserve our individual enterprises."

AMERICAN STOVE TO MAKE METAL COMPONENTS FOR ROCKETS

American Stove Company, St. Louis, will start production soon on rocket metal components for Army Ordnance, according to George P. Eichelsbach, Jr., vice president in charge of manufacturing.

A portion of the firm's St. Louis domestic gas range factory is now

being converted to accommodate the project, and production will commence in the near future. Floor space and facilities designated for the rocket program are independent of domestic manufacturing operations and will not interfere with normal plant capacity, Eichelsbach added.

THOR RECEIVES ORDER TO PRODUCE ARTILLERY SHELLS

Thor Corporation, a major producer of home laundry appliances, has announced receipt of a "large order" from the Army Ordnance Corps for the manufacture of artillery shells. The dollar amount was not disclosed. This is the first defense production order awarded Thor since World War II, when the com-

pany ranked among the nation's largest producers of shell boosters.

John R. Hurley, president of Thor, said the shells will be produced at the company's plant in Bloomington, Illinois. Shell production is not expected to interfere with that plant's output of wringer-type washing machines, he said.

BETTINGER APPOINTS NEW DIRECTORS, ISSUES STOCK

Myles L. Mace, chairman of the U. S. Department of Commerce Small Business Advisory Committee, and George M. Hansen, president of the National Federation of Financial Analysts were recently appointed direc-

tors of Bettinger Enamel Corporation, it was announced by Robert A. Weaver, Jr., president.

Simultaneously, Bettinger announced the offering of 59,576 shares of common stock, the first public offering made by the company in its 26-year history. Proceeds from the sale of stock will be used for addition-

BINKS

Dynaprecipitor Water Wash

CERAMIC SPRAY BOOTHS



NO OTHER SPRAY BOOTHS GIVE YOU ALL THESE ADVANTAGES

- 1 Approved performance and construction:** When you install a Binks Dynaprecipitor Spray Booth in your enameling department you have done everything possible to eliminate fire and health hazards. These booths meet the requirements of both local and state authorities...are endorsed by insurance companies. They are the mark of a safely equipped shop.
- 2 Exhaust air washed 5 times:** The patented Dynaprecipitor principle draws frit-laden over-spray through 5 unbroken water-curtains before it is vented...clean, odorless and dry.
- 3 No nozzles to clog:** The unique water distribution system in these booths eliminates nozzles...guarantees thorough washing.
- 4 Faster production:** Stops drift...lets you place spray stations closer to each other. Minimizes clean-up time.
- 5 Better shop morale:** There is no paint smell...air in the shop remains fresh...and the shop stays cleaner.
- 6 Reclamation of over-spray:** All frit in the over-spray is reclaimed. This is accomplished by exhausting the air through a specially designed system of baffles which trap the big majority of the frit. The remaining frit is washed from the exhaust air as it passes through five thorough washings in the booth.
- 7 Simplified construction:** Dynaprecipitor booths are shop fabricated in standard sizes from 4 to 20 feet long. Panels bolt together with gasketed joints, quickly and simply.
- 8 Priced right:** This is equipment on which you do not pay a premium to get the best. Dynaprecipitor spray booths are unsurpassed...but you don't pay any more for them.
- 9 Economical to operate:** The same water is recirculated. Only cost is operation of the circulation pump...which is specially designed of abrasion-resistant materials to provide long life.

Binks

MANUFACTURING COMPANY

3122-40 Carroll Ave., Chicago 12, Ill.



Send for
BULLETIN 500

and see for yourself the many great advantages of these modern, well engineered spray booths. No obligation.

NEW YORK
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LOS ANGELES
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ATLANTA
ST. LOUIS

BOSTON
SAN FRANCISCO

CLEVELAND
SEATTLE

DALLAS
SEATTLE

MILWAUKEE
NASHVILLE
WINDSOR, ONTARIO, CANADA

al equipment and working capital for the expansion of production, it was stated.

Since the present management of the company assumed control in 1947, the annual volume of business rose from \$270,000 to \$600,000 in 1949, and an estimated \$750,000 in 1950. The growth in volume is attributed mainly to the development of seven new products in the enameled steel field, in addition to increased production of standard products

normally manufactured by the industry.

CORROSION COURSE AT MIT

Leading industrial authorities will join members of the MIT faculty to present a one-week intensive course on "corrosion" at the Massachusetts Institute of Technology from June 18 to 23, according to Prof. Walter H. Gale, director of the MIT summer session.

\$10,300,000 IN MORTAR SHELL ORDERS RECEIVED BY RHEEM

The Army Ordnance Corps has awarded Rheem Manufacturing Company two letter of intent orders for mortar shells totalling \$10,300,000, according to C. V. Coons, Rheem vice president.

Rheem, a major producer of home appliances and steel shipping containers, will manufacture the shell at its Houston, Texas, plant, where a similar shell was produced for the Army in World War II. The company has

placed orders for more than \$1,400,000 worth of new machine tools, and will manufacture or purchase additional special tooling worth approximately \$207,000.

LUBRICATION ENGINEERS

ANNUAL MEETING, APRIL 16-18

The annual convention of the American Society of Lubrication Engineers, and concurrent annual Lub-

rication Show, will be held at the Bellevue-Stratford Hotel, Philadelphia, April 16, 17 and 18.

The principal speaker at the banquet, on April 17, will be Henning W. Prentis, Jr., chairman of the board, Armstrong Cork Co., and past president of the National Association of Manufacturers.

MISCO'S ROLLED PRODUCTS

DIV. OPENS NEW WAREHOUSE

The Rolled Products Division of Michigan Steel Casting Company has announced the opening of a new warehouse building in Detroit at 4315 Bellvue.

The warehouse will house a complete line of rolled mill forms of high temperature alloys centering around the 35%Ni-15%Cr, 25%Cr-20%Ni, and 25%Cr-12%Ni grades. Stock will consist of sheet, plate, rounds, flats, squares, pipe, nuts, welding rod, and a department for forming special shapes, states Paul Goetcheus, manager of the division.



SPRINGMAKING "know how"—and, of course, modern manufacturing facilities—can mean a lot to spring users. The three springs illustrated are good examples of how Accurate can slash spring costs with modern methods. Where previously multiple operations were required in the manufacture of these springs, Accurate produces each in a single operation at a unit price of a fraction of a cent!

We'd like to show those of you who are users of large quantities of springs how we can cut your costs. Write or call today.

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Ask for the Accurate Spring handbook



It's MISCO for HEAT RESISTING ALLOYS IN ROLLED MILL FORMS

Sheets — Plates — Rounds — Squares — Hexagons — Flats — Angles — Channels — Sections — Pipe — Nuts — Welding Rod

MAKE Your Enameling Fixtures with MISCO METAL—there is no finer Heat Resisting Alloy

STRONGER
ECONOMICAL
SCALE RESISTANT



ROLLED PRODUCTS DIVISION Michigan Steel Casting Company

MISCO

1999 GUOIN ST. • DETROIT 7, MICH.

One of the World's Pioneer Producers and Distributors of Heat and Corrosion Resisting Alloys

Lewis P. Favorite has been named manager of Aluminum Company of America's New York district sales office, succeeding Edward B. Wilber, who has been elected president of American Lumber & Treating Co., Chicago. Mr. Favorite, with Alcoa for over 23 years, assumed his new duties March 1.

ADDRESSES RUTGERS CLUB

George C. Betz, of Metal & Thermit Corporation, discussed "Ceramic Glazes and Vitreous Enamel Opacifiers" before the February 14 meeting of the Rutgers University Ceramic Club.

HARNER TO JONES METAL PROD.

News comes to finish that Richard P. Harner, formerly of Ferro Enamel Corporation, Cleveland, and more recently with Tuttle & Kift, Inc., Chicago, has joined the organization of Jones Metal Products Co., West Lafayette, Ohio.

Harner's new position with Jones Metal is that of general sales manager of the industrial lighting division.

CANADIAN POLYMER FORUM TO BE HELD MAY 24-25

The 3rd Canadian High Polymer Forum, sponsored by The Chemical Institute of Canada, will be held Thursday and Friday, May 24 and 25, at the Royal Military College, Kingston, Ontario. An extensive program of papers is included in the forum which also has the support of the National Research Council of Canada.

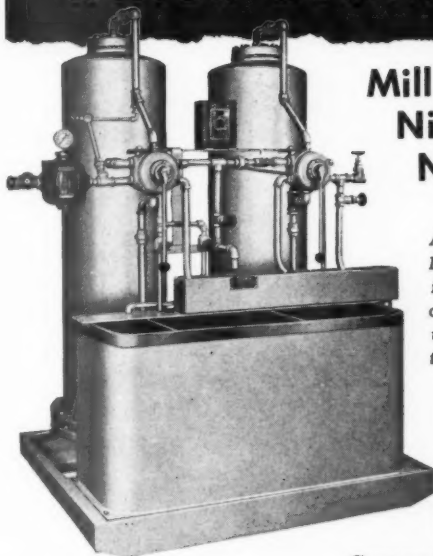
PENNSALT REPORTS RECORD EARNINGS IN 100TH YEAR

Pennsylvania Salt Manufacturing Company has reported net earnings after taxes for the 12 months ended December 31, 1950, were \$4,005,862, the highest in the company's 100 years. These earnings, subject to final audit, were 49% higher than profits of \$2,686,760 earned in 1949, and 118% more than the average annual profit for the preceding decade. After allowing for preferred stock

finish APRIL • 1951

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INDUSTRIAL WATER DEMINERALIZERS



Mill Room Water Nickel Dip Solutions Neutralizer Solutions

A Two-Bed INDUSTRIAL Water Demineralizer. Standard two- and four-bed units available with capacities of 200 to 1000 gph. Special units of any capacity engineered to requirements.

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many ways...**

Cost analyses are proving that the use of raw water in metal coating processes is not so cheap after all. This is especially true when mineral-free water can be obtained for a matter of cents per 1000 gallons in any quantity with an INDUSTRIAL water demineralizer.

The operation is very simple. Raw water is passed through alternate beds of ion-exchange resins, and it comes out free of all mineral salts. No steam, heat, still, or cooling water is needed — keeping space requirements at a minimum.

It's simple to get the complete facts for your case. Send us a water analysis and let us know how much water you have to treat and the gallons per hour needed. We can then give you the whole demineralizer story including estimated costs, equipment required, performance data, etc., for your requirements.

INDUSTRIAL FILTERS

for Clarification of Nickel Dip Solutions — Neutralizer Solutions ANY QUANTITY

A Typical INDUSTRIAL Filter. Standard portable and stationary models available with capacities of 100 to 15,000 gph. Special filtration systems engineered to meet unusual requirements.



Write for full information and recommendations.

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FILTERS	PUMPS	CORROSION TESTING APPARATUS
Pressure Type	Centrifugal	Salt Fog • Humidity
RUBBER DIVISION		
Vulcanized Linings • Molded Products		
WATER		
DEMINERALIZERS		

dividends, the 1950 profit amounted to \$3.97 per share on 997,121 shares

outstanding at the end of the year.

WEST COAST ENAMELERS DISCUSS PERSONNEL RELATIONS

by Gilbert C. Close • CORRESPONDENT

The Pacific Coast Enamelers Club held its first official 1951 meeting on Friday evening, March 9, at Maywood, California. Fifty members signed the roll, then enjoyed a fine chicken dinner to get them in the mood for the evening's business.

New officers of the Club (photo on page 52), presiding for the first

time, included: Howard Burlingame, California Metal Enameling Co., president; Roy Hastings, Gaffers & Sattler, vice president; Hyman Leggett, California Metal Enameling, secretary-treasurer; and J. R. Iander, Industrial Publications, ass't secretary-treasurer.

Charles A. McKeand, director of

employment relations for the Los Angeles Merchants and Manufacturers Association, presented the key speech of the evening. His topic was "Management and Employee Relationships."

The speaker noted that in the enameling industry particularly, many supervisory personnel rise from the ranks. The first thing the new supervisor, superintendent, or foreman must learn if he wants to become successful is that his ability to deal with people is far more important than his technical skill, the speaker pointed out. "He must change the old tool kit of his trade for a new tool kit containing characteristics and practices more applicable to his new job."

These new tools, McKeand said, include (1) planning ability, (2) job know-how, (3) fair play, (4) friendly attitude, (5) appreciation of honest effort, (6) consideration, (7) consistency, (8) self control, and (9) the ability and will to keep promises, maintain an open mind, instruct clearly, practice safety, lead—not drive, and be loyal to those above and below his status in the organization.

NEW PANGBORN DIRECTORS

Victor F. Stine and Lloyd L. Stouffer have been elected directors of Pangborn Corporation, Hagerstown (Md.) manufacturers of blast cleaning and dust control equipment. Stine is also now vice president in charge of sales and engineering, and Stouffer is the new secretary and treasurer and has charge of production.

INGERSOLL NAMES MROZEK MGR. OF KALAMAZOO PLANT

Tony Mrozek, for the past two years manager of contact sales in the central office, has been named factory manager of Borg-Warner's Ingersoll Products Division plant, Kalamazoo, Michigan.

For many years, Mrozek worked at Ingersoll's Chicago plant in production planning and scheduling. During the war he was located in Kalamazoo in the service of the Navy as resident inspector of Naval Material

Orefraction Zircon has many properties which make it a superior working material. Its dense body, wide maturing ranges at normal firings, high mechanical and dielectric strength and low coefficient of expansion make it ideal for

enamels, porcelains and special glasses.

Enlarged control-laboratories, together with expanded preparation, separation and beneficiation facilities—enable Orefraction to meet your most exacting requirements.

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RUTILE

Send for working samples and information. Our Ceramic Engineers are available for consultation.

- Enamels
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for use in:

- Spark Plugs
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Quality

FRITS

Our frits are made to require the minimum amount of service, but we are capable and qualified to service any frit we manufacture. We render our service with full sincerity, for the utmost benefit to the customer.

APEC has the equipment and personnel to answer any question which might arise in your plant regarding your porcelain enamel operations and to supply information regarding any material you are using.

Our laboratory contains the most up-to-date testing equipment. All possible bugs are worked out in the laboratory before a pound of frit leaves our plant.



for the Western Michigan district. After his wartime service he joined

the company's central office sales department.

MIDWEST ENAMELERS CLUB CELEBRATES 25TH ANNIVERSARY



Two of three guests of honor were E. P. Calkins (left) and Ben DeVorak. M. M. Kraft, another "charter member" also attended the celebration.

The Midwest Enamelers Club held its 25th anniversary celebration at the LaSalle Hotel, Chicago, March 3. Guests of honor were three of the handful of men who attended the first meeting of the organization back on January 7, 1926. Following luncheon, F. A. Petersen, president, introduced the guests of honor: E. P. Calkins, of Lawndale Enameling; Ben DeVorak, of DeKalb Enameling; and M. M. Kraft, of Kraft Chemical.

Club members then listened to two talks: "D-Enameling as a Business," by Art Lander, of New Process D-Enameling Co., and "Significance of

Porcelain Enameling Developments in the Past Quarter Century," by E. G. Benson, of A. J. Boynton & Co.

After reviewing the history of

O. HOMMEL OBSERVING 60TH YEAR OF BUSINESS

The O. Hommel Company, Pittsburgh, Pa., manufacturers of supplies for the porcelain enameling and other ceramic industries, is now observing its 60th year of business. Oscar Hommel, founder, began operations before the turn of the century in a small building on Penn Avenue with a staff of three persons. The location served as both factory and office. During its

de-enameling, Lander described the progress made in this field by his own company in the 22 months since their Chicago pilot plant was put in operation. He stated that they recently acquired a larger plant in nearby Aurora, and hope to continue expansion to satisfy the needs of manufacturers who have a salvage problem.

Regarding the success achieved in re-enameling such appliance parts as stove tops, sinks and washing machine tubs, Lander said that one of their customers reported that loss from re-enameling stove tops that had been de-enamelled "was less than 3%."

In his talk, Benson reviewed the developments of the past 25 years that brought the enameling industry to two avenues open for future development—protective coatings in the temperature range above the former 1600° F. maximum, and enamels that can be fired at lower temperatures such as the new 1300° to 1350° F. enamels.

infancy, the company concentrated on the importation of bronze powders. The product list soon was enlarged with the addition of ceramic colors and equipment.

In 1909, with more space needed to manufacture ceramic colors and bronze powders for the growing ceramic industries, Hommel broke ground in Carnegie, a suburb of Pittsburgh, on the site of its present plant.

In 1916, tragedy struck—the plant was hit by lightning, followed by an uncontrollable fire and complete destruction. All stocks of material were lost, and machinery was damaged beyond repair. The world was in the throes of World War I, so replacement of any machine parts from Europe were out of the question. Mr. Hommel, however, reconstructed the plant with new machinery, utilizing American ingenuity in improving on the equipment that had been lost. In the new plant, the company continued to expand and began to diversify its activities, until now it is a manufacturer of all the basic materials used through the porcelain enamel, glass and pottery industries,

Pacific Coast Enamelers Club officers, left to right: Hyman Leggett, Roy Hastings, Howard Burlingame, and J. R. Lander (story on page 50).



report from the home-front:

THIN-COAT

Titania enamels have

GREATER

abrasion-resistance



*A*n unexpected bonus has rewarded the many formulators who pioneered titania enamels. The question about how well a thinner coat titania enamel would resist abrasion is answered. Reports from the kitchen front during the past several years indicate that thin-coat titania enamels have even greater abrasion-resistance than thick enamels.

And today, with TITANOX-TG available, single-coat enamel formulators are assured of even better results.

This non-pigmentary titanium dioxide is specially processed for ceramic use. It yields greater opacity, assures unvarying color uniformity, faster and more economical production. TITANOX-TG is the logical basis for all titania enamel formulations.

Our Technical Service Department is always ready to help you with your individual problems. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments, Limited, Montreal 2; Toronto 1.

TITANOX

the brightest name in ceramics

**TITANIUM PIGMENT
CORPORATION**

Subsidiary of NATIONAL LEAD COMPANY



for the Western Michigan district. After his wartime service he joined the company's central office sales department.

MIDWEST ENAMELERS CLUB CELEBRATES 25TH ANNIVERSARY



Two of three guests of honor were E. P. Calkins (left) and Ben DeVorak. M. M. Kraft, another "charter member" also attended the celebration.

The Midwest Enamelers Club held its 25th anniversary celebration at the LaSalle Hotel, Chicago, March 3. Guests of honor were three of the handful of men who attended the first meeting of the organization back on January 7, 1926. Following luncheon, F. A. Petersen, president, introduced the guests of honor: E. P. Calkins, of Lawndale Enameling; Ben DeVorak, of DeKalb Enameling; and M. M. Kraft, of Kraft Chemical.

Club members then listened to two talks: "D-Enameling as a Business," by Art Lander, of New Process D-Enameling Co., and "Significance of

Porcelain Enameling Developments in the Past Quarter Century," by E. G. Benson, of A. J. Boynton & Co. After reviewing the history of

O. HOMMEL OBSERVING 60TH YEAR OF BUSINESS

The O. Hommel Company, Pittsburgh, Pa., manufacturers of supplies for the porcelain enameling and other ceramic industries, is now observing its 60th year of business. Oscar Hommel, founder, began operations before the turn of the century in a small building on Penn Avenue with a staff of three persons. The location served as both factory and office. During its

de-enameling, Lander described the progress made in this field by his own company in the 22 months since their Chicago pilot plant was put in operation. He stated that they recently acquired a larger plant in nearby Aurora, and hope to continue expansion to satisfy the needs of manufacturers who have a salvage problem.

Regarding the success achieved in re-enameling such appliance parts as stove tops, sinks and washing machine tubs, Lander said that one of their customers reported that loss from re-enameling stove tops that had been de-enamelled "was less than 3%."

In his talk, Benson reviewed the developments of the past 25 years that brought the enameling industry to two avenues open for future development—protective coatings in the temperature range above the former 1600° F. maximum, and enamels that can be fired at lower temperatures such as the new 1300° to 1350° F. enamels.

infancy, the company concentrated on the importation of bronze powders. The product list soon was enlarged with the addition of ceramic colors and equipment.

In 1909, with more space needed to manufacture ceramic colors and bronze powders for the growing ceramic industries, Hommel broke ground in Carnegie, a suburb of Pittsburgh, on the site of its present plant.

In 1916, tragedy struck—the plant was hit by lightning, followed by an uncontrollable fire and complete destruction. All stocks of material were lost, and machinery was damaged beyond repair. The world was in the throes of World War I, so replacement of any machine parts from Europe were out of the question. Mr. Hommel, however, reconstructed the plant with new machinery, utilizing American ingenuity in improving on the equipment that had been lost. In the new plant, the company continued to expand and began to diversify its activities, until now it is a manufacturer of all the basic materials used through the porcelain enamel, glass and pottery industries.

Pacific Coast Enamelers Club officers, left to right: Hyman Leggett, Roy Hastings, Howard Burlingame, and J. R. Lander (story on page 50).



report from the home-front:

THIN-COAT

Titania enamels have

GREATER

abrasion-resistance



*A*n unexpected bonus has rewarded the many formulators who pioneered titania enamels. The question about how well a thinner coat titania enamel would resist abrasion is answered. Reports from the kitchen front during the past several years indicate that thin-coat titania enamels have even greater abrasion-resistance than thick enamels.

And today, with TITANOX-TG available, single-coat enamel formulators are assured of even better results. This non-pigmentary titanium dioxide is specially processed for ceramic use. It yields greater opacity, assures unvarying color uniformity, faster and more economical production. TITANOX-TG is the logical basis for all titania enamel formulations.

Our Technical Service Department is always ready to help you with your individual problems. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments, Limited, Montreal 2; Toronto 1.

TITANOX

the brightest name in ceramics

**TITANIUM PIGMENT
CORPORATION**

Subsidiary of NATIONAL LEAD COMPANY



as well as special heat and fade-resisting pigments for coloring.

From 1940 through 1945, the company converted its manufacturing and research facilities to an "all out" effort for essential war production which was recognized when The O. Hommel Company was awarded the Army-Navy E.

In 1951, with 60 years of continuous progress behind it, the company has also developed a world-wide market. Aside from complete represen-

tation in the United States, O. Hommel sales representatives are established in Belgium, France, Luxembourg, The Netherlands, South Africa, Argentina, Uruguay, Brazil, Mexico, Spain, and Sweden. Direct selling is done to porcelain enameling companies throughout the rest of the world. In England, an associate company manufactures porcelain enamel frit.

Today, the company employs approximately 200 persons in research,

manufacturing and sales, many of them with the company for many years. Included are:

Ernest M. Hommel, president (26 years); H. R. Urbach, general man-



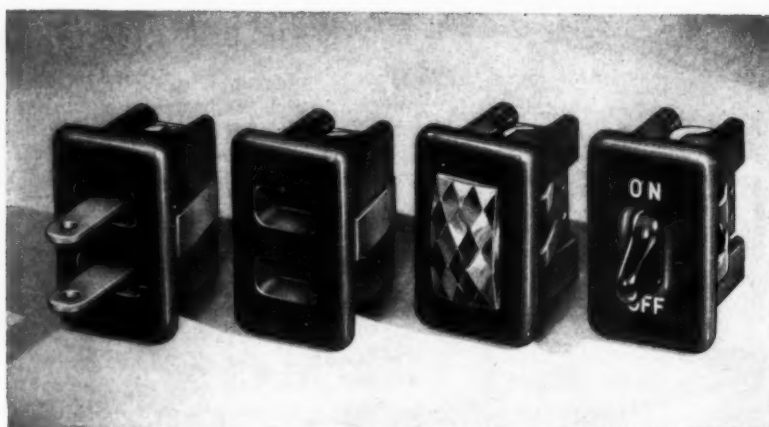
ERNEST M. HOMMEL

ager and treasurer (43 yrs.); E. J. Feeney, manager of porcelain enamel frit division (15 yrs.); J. F. Matejczyk, coordinator of research and manufacturing; Adolph Langerman, head of the frit control laboratory (36 yrs.); J. J. Kostishack, general foreman of ceramic color manufacturing department (21 yrs.); P. D. Henry, directing the color laboratory (15 yrs.); W. E. Dougherty, manager of ceramic color and glaze frit division (30 yrs.); W. E. Naylor, analytical laboratory (18 yrs.); and J. B. O'Connor, color laboratory (23 yrs.), prior to his present work in sales.

Other old timers are: W. T. Campbell, secretary; J. F. McCrory, manager of chemical re-sale division; J. H. Sylvester, plant superintendent; and J. H. Clatty, who has the responsibility for frit manufacturing. More than 25 per cent of the employees have been with the company for 10 years or longer.

To serve the ceramic industry during the present emergency brought about by shortages and restrictions, The O. Hommel Company is reported to have developed two new series of ground coat frits that contain non-strategic materials.

Although the company has always maintained its own research and development laboratories, Oscar Hom-



For Faster Assembly, **Tops in Looks and Action**

Use "Diamond H" Snap-Ins In Your Products, Too

Manufacturers of scores of electrically controlled or operated products, from hot plates and stoves to dictating machines and test panels, use "Diamond H" Snap-Ins to save costs on their assembly lines and assure the utmost in appearance and performance in their products.

Toggle switches, convenience outlets, pilot lights and inter-connecting load plugs just snap into 21/32" x 1-7/32" holes where spring clips hold them tight. Wire them up before or after. In black, white, brown or special color plastic to match or harmonize with your product.

- **Wide Flanges** eliminate need for exacting tolerances in finishing around installation holes.
- **Switch Contacts** are held together under pressure of spring action in "on" position to give positive, *unfailing* action. Ratings: 15 and 20 A, 125 V; 10 A, 250 V, A. C. Also H. P. ratings.
- **Pilots**, with large, faceted lenses, give greatest light output of any comparable pilots on the market. Rated 115 V. or 230 V., A. C.
- **Convenience Outlets** and **Inter-Connecting Load Plugs**, like all "Diamond H" products, are ruggedly built for long service.

Write today for complete details on how "Diamond H" Snap-Ins will help you make a better product at lower cost.

THE HART MANUFACTURING COMPANY
214 Bartholomew Ave., Hartford, Conn.

mel augmented these facilities by establishing at Mellon Institute in 1933 a Research Fellowship, which since 1940 has had as its Senior Fellow, Dr. E. E. Marbaker.

Ernest M. Hommel, son of the founder and president since 1940, outlines the policy of the company in an excerpt from an open letter to the industry:

"Through constant research both at our plant and at Mellon Institute, we are exerting every effort to make our products the best in the ceramic industry. This diligent perseverance and progress in research has helped our company produce materials that meet highest standards. We pledge a continuance of this policy."

TEN NEW CERTIFICATIONS IN NATIONAL SAFE TRANSIT PROGRAM

Nine manufacturers and one additional laboratory have been certified by the National Safe Transit Committee since the complete list was published in February *finish*.

The manufacturers are:

AllianceWare, Inc.
Alliance, Ohio
Boston Stove Foundry Company
Reading, Massachusetts
Dearborn Stove Company
Chicago, Illinois
Duo-Therm Division, Motor
Wheel Corporation
Lansing, Michigan
Mt. Vernon Furnace & Mfg. Co.
Mt. Vernon, Illinois
Newark Stove Company
Newark, Ohio
Prentiss Wabers Products Co.
Wisconsin Rapids, Wisconsin
Temco, Inc.
Nashville, Tennessee
S. S. White Dental Manufacturing Company
Staten Island, New York

The laboratory is:
Rathborne, Hair & Ridgway Box
Co.
Chicago, Illinois

\$4 MILLION JET PLANE FUEL TANK CONTRACT TO SEEGER

Seeger Refrigerator Co., St. Paul, has announced that it has received a \$4,000,000 defense contract to make fuel tanks for jet fighter planes.

John S. Holl, president, stated *finish* APRIL • 1951

that this contract will avert layoffs of personnel that would have been necessary from a projected cutback

of 20 per cent on refrigerator production on April 1.

ELECTROPLATERS TO HOLD ANNUAL MEETING IN BUFFALO

The American Electroplaters Society will hold their annual convention in Buffalo, N. Y., at the Statler Hotel, July 30 through August 2.

Dr. William Blum, of the National Bureau of Standards, will be the keynote speaker at the morning session

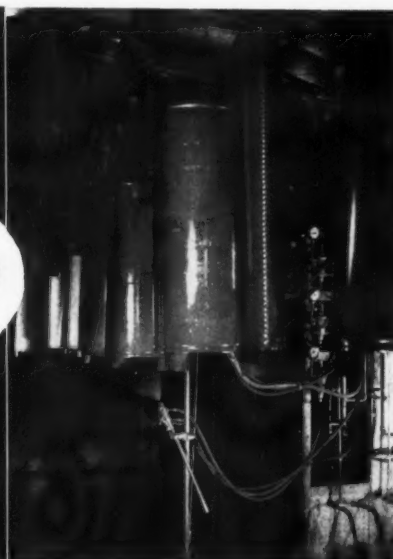
on Monday morning. "Some Engineering aspects of Plating Room Operation" will be the topic for the Monday afternoon session.

On Tuesday morning, there will be a symposium on "Finishing and Plating of Die Castings." Tuesday

Ransburg
Electro-Spray
Means . . .

UNIFORM
HIGH QUALITY at
LOWER COST

Automatic electro-spray
process for auto mufflers
eliminates variable results
of hand-spray method.



● Where uniform high quality in painting is important, you can depend upon RANSBURG Electro-Spray to do the job.

Take for instance, the AP Parts Corporation, in Toledo, Manufacturers of automobile mufflers. This company converted from hand spray to RANSBURG Electro-Spray.

Results? Quality is tops, with 100% coverage. Paint savings, 62% of

former cost. And the flexibility of the unit permits rapid change for handling units of various sizes and colors . . . an important feature for this customer.

★ ★ ★

We will analyze your individual paint requirements. Possibilities can be checked quickly in our test laboratory by Ransburg engineers.

Electrostatic Painting Processes

RANSBURG ELECTRO-COATING CORP.

.....

Indianapolis 7, Indiana

RANSBURG

afternoon will be devoted to an open forum on "Substitute Finishes." Five qualified speakers will introduce different phases of the subject in short talks.

The Wednesday morning session will be devoted to "Plating Control," and the Thursday morning session to reports on "American Electroplating Society Research."

EASTERN REFRIGERATION, AIR CONDITIONING CONFERENCE

The 1951 Eastern Refrigeration and Air Conditioning Educational Exhibit and Conference will be held in Buffalo, New York, April 6, 7 and 8. It is the last in a series of

such sectional conferences sponsored by the Refrigeration Equipment Manufacturers Association and the Refrigeration Service Engineers Society.

The entire 17th floor of the Hotel

Statler will be used to house exhibits, with meetings held on the same floor.

This conference will have an international flavor with the Canadian Refrigeration Equipment Manufacturers Association and the Interprovincial Association, both of Canada, joining with REMA and RSES in making it a big success. Also cooperating are the Refrigeration Equipment Wholesalers Association and Air Conditioning Contractors Association.

GLIDDEN 1950 SALES

\$8.5 MILLION

Net earnings of The Glidden Company and subsidiaries in their past fiscal year was \$8,561,660, equal to \$4.11 a share on the 1,971,623 common shares, Dwight P. Joyce, president, reported.

PAINT INDUSTRIES MEETINGS IN ATLANTIC CITY THIS FALL

Joseph F. Battley, president, of the National Paint, Varnish and Lacquer Association, has announced that the Association's annual convention will be held October 29, 30 and 31, in Atlantic City, N. J. Immediately following will be the annual convention of the Federation of Paint and Varnish Production Clubs, on November 1, 2 and 3, it was stated.

WESTINGHOUSE DISTRICT HAS NEW CHICAGO HOME

The northwestern district headquarters and Chicago sales office of Westinghouse Electric Corporation have been moved to a new and permanent location encompassing 45,000 square feet of space in The Merchandise Mart, Chicago, it was announced jointly by Wallace O. Ollman, Mart general manager, and Fred T. Whiting, vice president of Westinghouse.

The space will house the firm's appliance, apparatus, lamp, Sturtevant and home radio divisions, as well as the apparatus engineering and service staffs. More than 300 Westinghouse employees are involved in the transfer.

in 1950...
Over 100,000,000

fabricated pieces
of Fiberglas* Insulation
were delivered
to appliance makers
...an average of
about 300,000
pieces per day!
a real servicing job
possible only because...



**Our plants are part
of your production line!**

Newark, Ohio • Kansas City, Kan. • Santa Clara, Calif.

*FIBERGLAS is the trade mark (Reg. U. S. Pat. Off.) of Owens Corning Fiberglas Corporation for products made of or with glass fibers.



ING-RICH NAME CHANGE

Effective March 8th, the name of Ingram-Richardson Manufacturing Company of Indiana, Inc. was changed to Ingram-Richardson, Inc., according to an announcement by R. S. Dukes, secretary-treasurer. There is no change in the officers and management of the company, or in the board of directors. The company's policies remain the same, the report states.

TECHNICAL CONFERENCE ON HOME APPLIANCES, MAY 15

A Technical Conference on Home Appliances will be held May 15, with Battelle Institute, Columbus, Ohio, as host, it has been announced by T. H. Cline, of Newark Stove Company, and vice chairman of the Committee on Domestic and Commercial Applications of the American Institute of Electrical Engineers.

MAYPOLE PARTY, MAY 18

The Midwest Enamelers Club has announced that its annual Maypole Party will be held this year on May 18, at the Sportsman Golf Club, site of last year's event.

NEW PATTERSON SALES OFFICE

A new district sales office in Denver for servicing the chemical processing industries in Colorado, Utah, New Mexico and Wyoming, has been opened by The Patterson Foundry and Machine Co.

ALL-TIME HIGH EARNINGS REPORTED BY ADMIRAL

An all-time high in net earnings of \$18,767,554 on a record sales volume of \$230,397,661 was revealed in the annual report of Admiral Corporation, appliance, radio and television manufacturer. The 1950 sales volume represented an increase of 106% over a volume of \$112,004,251 in 1949.

In a message to stockholders, Ross D. Siragusa, president and board


chairman, said that appliance sales "substantially exceeded those of the past two years combined."

Relative to the outlook for defense production, Siragusa said that Admiral's military manufacturing potential today approaches \$400 million as compared to the \$40 million peak in 1944. From two plants, in which it manufactured electronic material in World War II, the structure has increased to eight plants, said Siragusa.

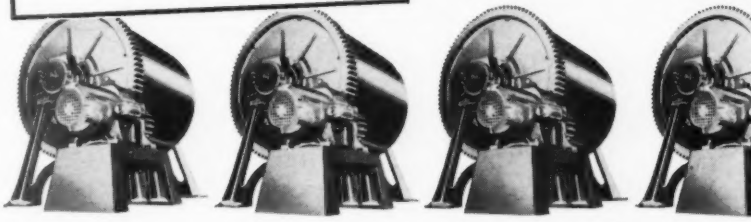
VITRO BUYS KALUNITE PLANT

Announcement has been made of the purchase of Salt Lake Kalunite Plant from J. R. Simplot, Boise industrialist, by Vitro Chemical Company, newly-formed and wholly-owned subsidiary of Vitro Manufacturing Company, Pittsburgh, Pa., manufacturers of ceramic colors.


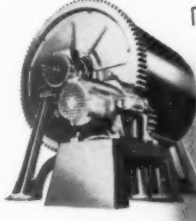
Located in Salt Lake City, Utah, the plant will be used to refine uranium ores for the Atomic Energy Com-

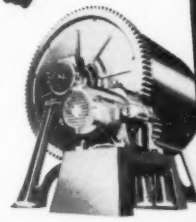


Uniform Performance



...in every degree
of finer grinding . . .
for better enamel
production!





Patterson **PEBBLE and BALL MILLS**

The Patterson Foundry and Machine Co.
East Liverpool, Ohio, U. S. A.

Richard L. Cameron

The Patterson Foundry and Machine Co., (Canada) Ltd.
Toronto, Canada

mission, and to process other strategic minerals and chemical specialties. Rehabilitation work on the million-dollar wartime plant is already underway.

W. C. Rickerson, chairman of the board, and A. J. Strod, president of Vitro Chemical, have announced the affiliation of Mr. Simplot as vice president. Other officers of the firm are M. G. McGrath, vice president, and R. T. Ruder, secretary-treasurer. Rickerson is also chairman and presi-

dent of the parent concern, Vitro Mfg.; Strod is president of Vitro's uranium division and will have charge of uranium activities at the Salt Lake City plant.

AMERICAN STOVE TO MAKE FUEL TANKS FOR JET PLANES

The Cleveland Division of American Stove Company recently was awarded a contract by Republic Aviation Corporation to make a large

number of external fuel tanks for the F-84 Thunderjet. Production will start as soon as the tooling required to produce these tanks has been completed.

PAINT HEATER WINS AWARD

A paint heater has been awarded the "Modern Designs" citation by



Design News magazine for "general excellence in mechanical design." The award was presented to James A. Bede (shown in photo with the heater), president of Bede Products, Inc., who developed the efficiently designed Bede paint heater.

The award is bestowed annually on the basis of excellence in "function, appearance and economy." Other winners have been Nash-Kelvinator Corp.'s Motor Car Division, Thor Corporation, Westinghouse Electric Appliance Division, and Allis-Chalmers Manufacturing Co.

DEVELOP NEW METHOD FOR CORROSION MEASUREMENT

A new technique, designed to measure the effects of corrosive solutions, may substantially reduce the nation's annual corrosion costs, estimated at \$5.5 billion or about \$37 per person.

Developed at the Armour Research Foundation of Illinois Institute of Technology, under the sponsorship of the National Advisory Committee for Aeronautics, the new method is similar to television scanning and can be used for detection, study, record-

to Page 60 →

PRODUCTION FOR DEFENSE OR ESSENTIAL CIVILIAN REQUIREMENTS

*The facilities and the 50 years experience
of Detroit Brass are available to you
on your DO-RATED PROGRAM*

If your program specifies brass machined parts or brass components, we suggest you consider the experience, capacity and dependability of your proposed source of supply.

If your components are to be produced from forgings, from extrusions or from castings, we offer you prompt production to meet schedule requirements.

If close tolerances are demanded—if familiarity with government specifications is desirable, you can be assured of special assistance in furthering your program by sending your inquiries to Detroit Brass.

DETROIT BRASS & MALLEABLE WORKS
SPECIALTIES DIVISION
DETROIT 9, MICHIGAN

AT YOUR SERVICE IN THE NATIONAL EMERGENCY

Flow coating . . .

→ from Page 28

3. When insurance or floor load restrictions prohibit use of large capacity dip tanks.

4. Where design of part is such that it causes excessive overspray loss in spray application.

5. Where there are areas requiring protection that are inaccessible for spray coating.

Technicians in the process hasten to warn manufacturers not to look on it as a panacea for all finishing evils or a "natural" for all coating problems.

For instance, it is quite obvious that the system cannot be adapted for the application of multi-colored or textured finishes.

Then, too, in its present degree of development it is not recommended for "finish coating" appliances or other metal parts requiring an extremely high appearance rating, expected of home appliance exteriors.

NEW LITERATURE

410. Information on metal cleaning materials and methods

A new 44-page illustrated booklet contains much information on metal cleaning materials and methods. Some of the data covers: tank cleaning methods; machine cleaning methods; electrocleaning steel; pickling; deoxidizing; bright dipping; steam detergent cleaning; burnishing; rust prevention; barrel cleaning; treating water in spray finishing booths; paint stripping; and cleaning in hard water areas.

411. Water demineralizers

New literature describes and illustrates water demineralizers for both laboratory and plant production use. Shown is a laboratory model, designed to attach to any wall near a water tap, which includes a "permanent cartridge" and a flow meter. Production equipment shown is available in models ranging in capacity from 30 to 1000 gallons per hour.

412. Bulletin on magnetic protection

A new bulletin describes the "magnetic hump," a non-electric unit designed to remove iron from materials conveyed in pneumatic, gravity flow or liquid lines. Included in the booklet are construction and application data, information on the selection of the proper magnetic separator and engineering diagrams.

413. Penetrant method of metal inspection

A new illustrated bulletin fully describes the dye penetrant method of metal inspection, and shows how this chemical process simplifies non-destructive testing. Dip, brush and spray methods are explained, and varied applications in factories and in the field are discussed.

414. Metallizing process

A 20-page bulletin, "Production Maintenance Miracles Now with the Metallizing Gun of Tomorrow," has just been published. The bulletin is fully illustrated and tells how this process aids in fighting corrosion, rebuilding worn parts, and reclaiming mis-machined castings.

415. Catalog on pressure filters

A new 8-page catalog goes into detail on the construction and operation of pressure filters for solution clarification. It gives complete information on standard models, types, and sizes for electroplating, electroforming, nickel dip, and neutralizer solutions.

416. Floor-type conveyor catalog

A new catalog contains 90 pages of information on conveyor chains, chain-on-flat, and chain-on-edge floor conveyors with a variety of pusher dogs used in connection with them. Also, typical drive and takeup ends, sprocket and roller turns, cross sections, curves, inclines and declines which are used in these conveyor systems.

Useful engineering data to the conveyor designer has been condensed into five pages. Many other types of floor conveyors, such as slat, apron, scraper, roller flight, etc. are shown. In addition to photographic illustrations and standard outline drawings, perspective drawings are widely used to acquaint the non-technical reader with the design of the equipment.

417. Booklet on steel exteriors for multi-storied buildings

A new 32-page booklet, "Steel Exteriors for Multi-Storied Buildings," describes two outstanding materials for building panels, stainless steel and porcelain enameled steel, both designed to give long maintenance-free life for the exterior building surface.

Stainless steel offers many advantages of easy fabrication and quick erection, and beautiful surface appearance. Porcelain enameled steel gives the additional advantage of color to architectural applications. Both types of surfaces are easy to clean and their use should result in low maintenance costs on future structures.

FINISH

360 N. Michigan Ave.
Chicago 1, Illinois

Please forward to me at once information on the new supplies and equipment and new industrial literature as enumerated below:

No. _____ No. _____ No. _____ No. _____

No. _____ No. _____ No. _____ No. _____

Name _____ Title _____

Company _____

Company Address _____

City _____ Zone _____ State _____

NEWS → from Page 58

ing, and analysis of corrosion phenomena.

Dr. Howard T. Francis, supervisor of electrochemistry at the Foundation, explains that scientists can now measure corrosion as it takes place, regardless of the metal involved.

This method is said to permit easier and faster study of the entire surface area of a corrosion sample. The new technique can be used for

investigations of cathodic protection, corrosion inhibitors, stress corrosion, and in fundamental corrosion studies.

PEI NEW USES COMMITTEE MEETS

The New Uses Committee of the Porcelain Enamel Institute met in Cleveland, Ohio, February 13, with Howard N. Williams acting as chairman in the absence of C. P. Lohman, regular chairman.

Present at the meeting were D. H. Harris, Porcelain Steel Corp.; M. J.

Keedy, Ingram-Richardson, Inc.; Burton Longwell, Republic Steel Corp.; Edw. Mackasek, Porcelain Enamel Institute; and Howard N. Williams, Pemco Corporation.

The functions of the committee are to uncover as many new uses for porcelain enamel as possible, and to arrange for the necessary experimental work to be done so that these uses can be exploited promptly when the supply situation changes. Mr. Mackasek states that the committee now has the responsibility formerly assigned to the Market Development Committee under the title of "Development Engineering."

SALES MGR. FOR DANLY PRESSES

Danly Machine Specialties, Inc., Chicago, has announced the appoint-



ment of Everett K. Morgan as general sales manager of their mechanical press line. Morgan was formerly associated with Giddings & Lewis Machine Tool Co., Fond du Lac, Wisconsin, and from 1937 to this year served that concern as vice president in charge of sales and manager of engineering.

ASM METALLURGY AWARD TO YOUNGSTOWN PRESIDENT

The Penn State Chapter of the American Society for Metals has announced the selection of J. L. Mauthe, president of The Youngstown Sheet and Tube Company, as the 1951 recipient of the David Ford McFarland

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BETTER GRIND
IN HALF
THE TIME**



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technical data,
case history reports,
samples.
Address:
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U. S. STONEWARE
Akron 9, Ohio

Award for "achievement in metallurgy." The presentation will be made at a dinner meeting, May 4, at State College, Pennsylvania, at which time Mr. Mauthe will deliver an address on "Economics and Engineering for Production of Modern Steels."

MELMER WITH WEBB OF CALIF.

Jervis B. Webb Company of California, 2650 East Washington Boulevard,



Los Angeles (subsidiary of Jervis B. Webb Company of Detroit, manufacturers of conveyors) announces the appointment of Eric O. Melmer as secretary and chief engineer.

Associated with the conveyor business for over twenty years as designer, chief draftsman and chief engineer, Melmer is credited with inventing several of the most widely used improvements in the materials handling industry.

EEI SALES CONFERENCE IN CHICAGO, APRIL 2-5

The 17th annual sales conference of the Edison Electric Institute will be held at the Edgewater Beach Hotel, Chicago, April 2-5, according to an announcement by Merrill E. Skinner, chairman, EEI Commercial Division General Committee.

National leaders in the electric utility sales and home appliance fields will address the general sessions scheduled to convene on Wednesday, April 4. The sales outlook for the year in the residential, farm, commercial

finish **APRIL • 1951**

and industrial markets will be discussed by industry leaders at four concurrent sectional meetings on Tuesday, April 3.

SCREW MACHINE PRODUCTS GROUP TO MEET IN APRIL

The screw machine products industry, long known as a high specialized, maximum production defense industry of component parts manufacturers, will hold its 18th annual meeting

at the Netherland Plaza, Cincinnati, April 18-21. Business at the annual meeting will include election of new officers and directors of the National Screw Machine Products Association.

Industry spokesmen say the business index has somewhat the appearance of the year 1941, prior to America's entry into the last war; and there is yet no indication that a cut-back of civilian business will flatten shipments and reduce backlog materially during the spring months.

Why pay for IRON SPOTS?

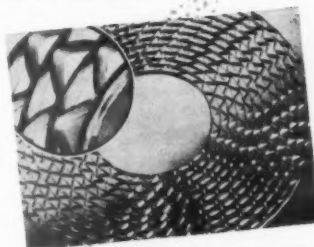
"Prevention is Cheaper"

with the

FRANTZ FERROFILTER



Enclosed pipe-line type FerroFilter sizes range from 1" to 3" IPS.



A FerroFilter grid. Magnified inset shows collected particles on grid edges.

On clean, iron-free enamel slips depend the sparkling enamel finishes that are so necessary for your finished products. Failure to eliminate iron contamination invariably costs you money—results in product rejections or lowering of grade.

YOU HAVE A CHOICE!

The electromagnetic pipe-line separator shown above fits into your dip tank circulating system and your liquid transfer system to supply you with the lowest cost finish insurance you can buy.

The Frantz FerroFilter offers the maximum in design simplicity, convenience, and real dollar saving economy that our experience as leading magnetic separator manufacturers has enabled us to put into it. The quality is backed by an unchallenged reputation and high performance records in leading plants all over the country.

Prove it for yourself! Have spoilage costs drop, production increase and rejects rare as a January heatwave—with the Frantz Electromagnetic FerroFilter.

Gravity type FerroFilters are available where a closed system is not required.

For further information
send for Bulletin No. 50

DEPT. F.

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1204

THE ONLY SOURCE *for* ALL THESE QUALITY BOXES *and* CRATES

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Our designing and testing laboratory,
supervised by experienced engineers, can assist you with
your packing problems, and is at your service without
obligation.

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Plants at: Helena, Arkansas • Greenville, Mississippi • Rockmart, Georgia
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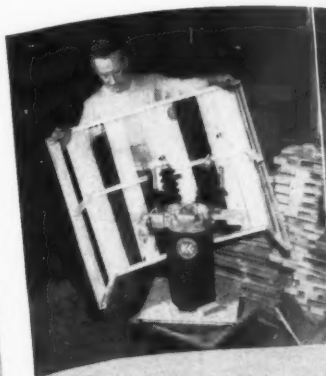
Now, more than ever before...

YOU NEED THE PROTECTION OF WIREBOUND BOXES and CRATES

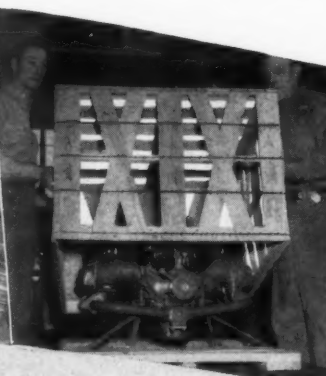
Losses due to container failure have no place in an industrial economy facing material allocations and shortages. That's why you should investigate *Wirebounds*—which combine the strength of steel with thinner wood to bring you *better product protection at lower cost*. Three hundred graduate engineers of the Wire-

bound Institute have been technically trained to design tailor-made *Wirebounds* which assure damage-free product delivery. The value of this container engineering is clearly demonstrated in the following case histories. We will be glad to show you how these benefits apply to *your* product. Use the coupon below.

YOU CAN CUT DAMAGE CLAIMS LIKE THIS:



Upside-down loading of circuit reclosers caused breakage, leakage, sometimes irreparable damage in handling and transit. Since switching to Wirebounds, company reports damage claims have become negligible.



Using Wirebounds designed to "float" 400 lb. precision engines, this manufacturer chalked up a record of 3000 shipments in fifteen months without a single instance of damage in transit due to container failure.



Flexible power saw maker reduced shipping weight from 820 to 775 pounds, cut crating time 30%. Company stacks and handles units four high. Shipping damage due to container failure has been completely eliminated.

choose your course of action...

**Wirebound
BOXES & CRATES**

☐

Send me general information... complete descriptive book titled "What to Expect from Wirebounds."

☐

Send me specific information... tear sheets of case histories of packing products similar to mine.

☐

Give me direct action send an Institute trained sales engineer to show the advantages of Wirebound packing for my own product.

NAME

POSITION

FIRM

STREET AND NUMBER

CITY

ZONE

STATE

OUR PRODUCT IS

IT WEIGHS

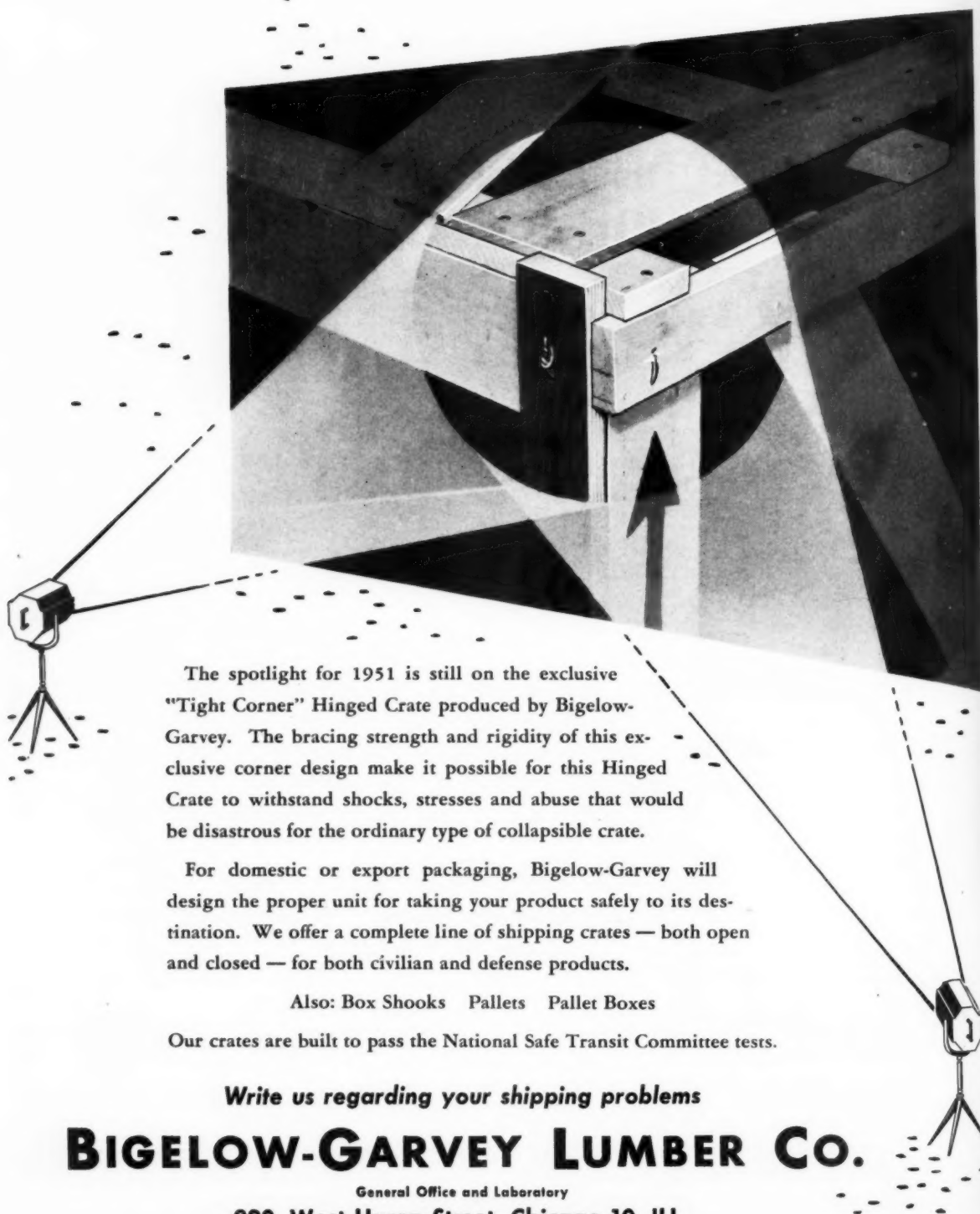
mail now to

WIREBOUND BOX MANUFACTURERS ASSOC.

Room 1154—327 South LaSalle Street, Chicago 4, Illinois

Users names on request

The Spotlight is on the "Tight Corner"



The spotlight for 1951 is still on the exclusive "Tight Corner" Hinged Crate produced by Bigelow-Garvey. The bracing strength and rigidity of this exclusive corner design make it possible for this Hinged Crate to withstand shocks, stresses and abuse that would be disastrous for the ordinary type of collapsible crate.

For domestic or export packaging, Bigelow-Garvey will design the proper unit for taking your product safely to its destination. We offer a complete line of shipping crates — both open and closed — for both civilian and defense products.

Also: Box Shooks Pallets Pallet Boxes

Our crates are built to pass the National Safe Transit Committee tests.

Write us regarding your shipping problems

BIGELOW-GARVEY LUMBER CO.

General Office and Laboratory

320 West Huron Street, Chicago 10, ILL.

MILLS: ARKANSAS GEORGIA WISCONSIN MINNESOTA ILLINOIS

April • 1951

safe transit

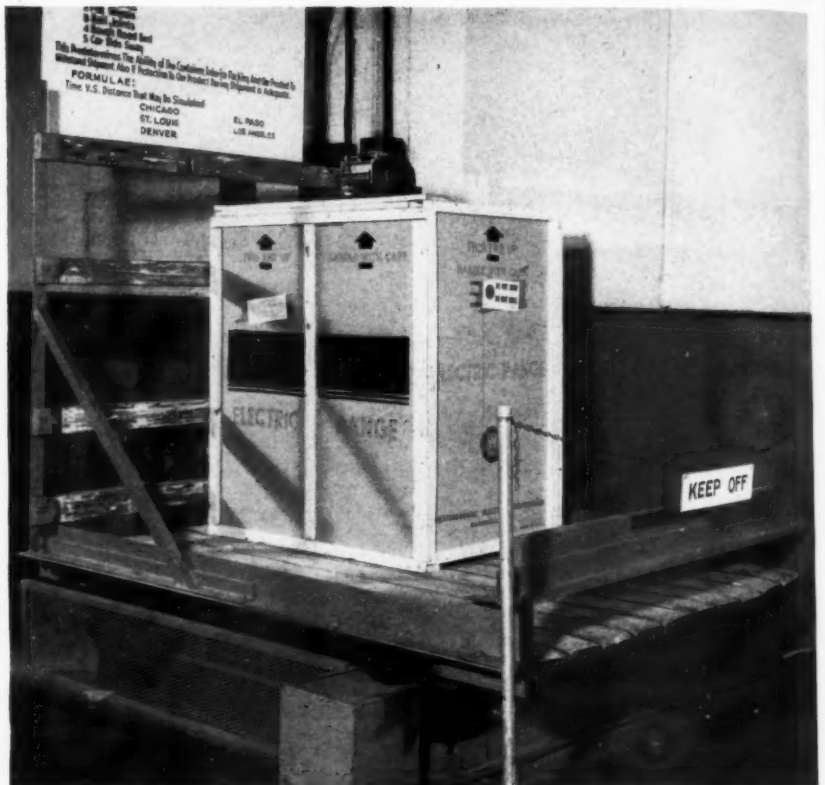
FROM ASSEMBLY LINE TO FINAL CUSTOMER

Some Users of L. A. B. Machine

Admiral Corporation, Chicago
 American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
 American Stove Company, St. Louis
 Andrew Jergens Co., Cincinnati
 Assn. of American Railroads, Chicago
 Atlas Plywood Corp., Boston
 Bendix Radio, Baltimore
 Brown Stove Works, Cleveland, Tenn.
 Brush Development Co., Cleveland, Ohio
 Canadian Westinghouse, Hamilton, Ontario
 Chicago Mill & Lumber Co., Chicago
 Coleman Company, Inc., Wichita
 Container Laboratories, Inc., New York
 Container Laboratories, Inc., Chicago
 Coolerator Company, Duluth
 Coster Container Corp., Cleveland, Ohio
 Crosley Division of Avco, Richmond, Ind.
 A.F.H. Devers & Co., Johannesburg, S. A.
 Dixie Foundry Co., Cleveland, Tenn.
 Estate Stove Co., Hamilton, Ohio
 Fairfield Paper & Container Co., Baltimore, Ohio
 Fedders-Quigan Corp., Buffalo
 Ford Motor Company, Dearborn, Mich.
 Forest Products Lab., Ottawa, Ontario
 Franklin Transformer Co., Minneapolis
 Frigidaire Division, GMC, Dayton
 General Electric Co., Bloomfield, N.J.
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 General Electric Co., Cleveland, Ohio
 General Electric Co., Erie, Pa.
 General Electric Co., Schenectady, N.Y.
 General Electric Co., Trenton, N.J.
 General Steel Works Ltd., Toronto
 Gibson Refrigerator Co., Greenville, Mich.
 Globe American Corp., Kokomo, Ind.
 Hardwick Stove Co., Cleveland, Tenn.
 Hinde & Dauch Paper Co., Sandusky, Ohio
 Heaver Company, North Canton, Ohio
 Hotpoint, Inc., Chicago
 Inland Container Corp., Indianapolis
 International Harvester Co., Chicago
 International Harvester Co., Evansville
 International Paper Co., Georgetown, S.C.
 Ironrite, Inc., Mount Clemens, Mich.
 Kohler Company, Kohler, Wis.
 Landers, Fray & Clark, New Britain, Conn.
 A. J. Lindemann & Hoverson Co., Milwaukee
 Malleable Iron Range Co., Beaver Dam, Wis.
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 Mullins Mfg. Corp., Salem, Ohio
 Murray Corp. of America, Scranton, Pa.
 Nash-Kelvinator Corp., Detroit
 Nashville Corporation, Nashville
 National Cash Register Co., Dayton
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 Northern Electric Co., Belleville, Ontario
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 Owens Illinois Glass Co., Toledo
 Pacific Coast Gas Assn., Los Angeles
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 War Department, Fort Belvoir, Va.

The L. A. B. PACKAGE TESTER

duplicates freight and motor truck damage



Package Tester in the plant of Westinghouse Electric Corporation, Mansfield, Ohio.

The Package Tester duplicates freight car and motor truck damage by means of an accelerated test, which, in a relatively few minutes, determines the ability of a package to withstand the shocks encountered in transit. In short, it tests "shipability."

The vibration and shocks, movements, pitch and toss of freight cars and motor trucks are definitely duplicated by this equipment which was scientifically designed by engineers with years of experience in building vibration testing apparatus for industry and for the Armed Forces.

APPROVED BY THE TECHNICAL PLANNING DIVISION
 OF THE NATIONAL SAFE TRANSIT COMMITTEE

Phone, write or wire for complete information and prices.

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L. A. B. CORPORATION • SUMMIT, NEW JERSEY • U. S. A.

safe transit

A monthly trade publication section devoted to improved packaging and shipping and materials handling practices in the home appliance and allied metal products field.

Plant experience information for all executives and plant men interested in the problem of packaging and shipping improvement and loss prevention.

Complete information on the National Safe Transit pre-shipment testing program for packaged finished products, and detailed progress reports of divisions and sub-committees of the National Safe Transit Committee.

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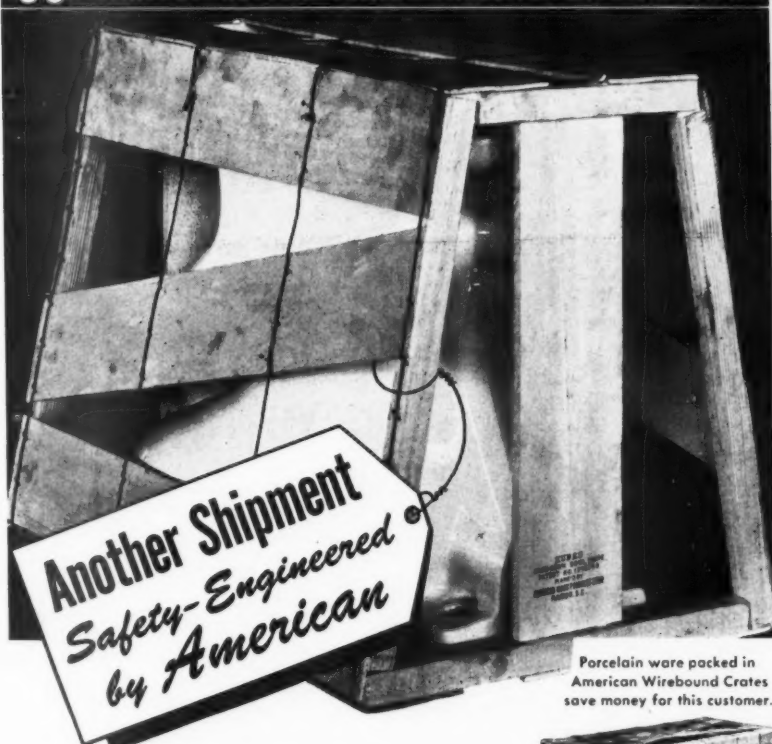
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50 YEARS OF BETTER BOXES — "THE American WAY"



Porcelain ware packed in American Wirebound Crates save money for this customer.

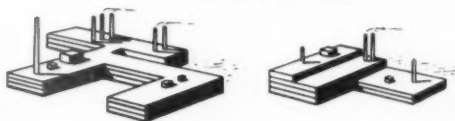
Here's Super-Protection for Shipping Your Sanitary Ware and Appliances!

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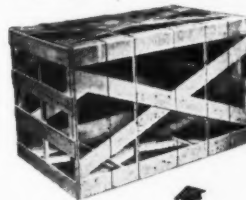
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TWO GREAT PLANTS (Est. 1901)

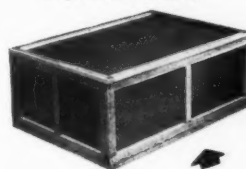
Centrally located in Cleveland, Ohio, and Marion, South Carolina; featuring most complete modern facilities for serving American industry.



THE American BOX CO.
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WIREBOUND CRATE
Strength-tested, lightweight. Built-in support features. Easy handling, stacks well. Supplied flat for wrap-around assembly.



FIBREBOARD BOX
Attractive, low-cost. Fully enclosed, panels steel stapled to wood cleats. Superior reinforcements. Supplied flat for easy assembly.



NAILED WOOD BOX
Materials and workmanship to meet or surpass Government Specifications for domestic or export shipments.

The National SAFE TRANSIT Program

designed to deliver home appliances and allied metal products safely
from the assembly line to the final customer

Foreword

Statement from the General Chairman of the National Safe Transit Committee

August 9, 1948, marked the beginning of the National Safe Transit Program as a strictly voluntary, cooperative movement for countering the mounting transit damage to home appliances and other finished metal products. By the end of 1949, 18 manufacturers had become certified, and as of January, 1951, a total of 62 manufacturers had joined the program.

Although we have come a long way since August 9, 1948, Safe Transit has just really begun. Many men and organizations have given freely of their time and efforts. The ground work has been done, the foundation laid and the frame work erected, but much still remains to be accomplished before we can consider our task completed.

The National Safe Transit Committee, from the beginning, was fully aware of the enormity of the task. Many attempts to find a solution to the transit damage problem had been made but the problem remained as a threat to the stability of the industry.

The uniqueness of the Safe Transit approach to the problem is in the fact that it offers a basic approach to the final solution. This is represented in the standardized program of *pre-shipment testing* of the **PACKAGED PRODUCT**. In other words, the approach to the solution was based on *prevention rather than cure* methods.

I became associated with the manufacturing of major appliances and allied metal products over 32 years ago. From the beginning, it seemed a shame to me to see a product smashed up in handling in transit after all of the time, effort and money invested by manufacturers and engineers to build it. In other words—"all manufacturing, engineering, and quality efforts are in vain if the product reaches its destination in a damaged condition."

The Safe Transit Program has already inspired other industries to a similar approach to their transit damage problems. Many individual companies have already volunteered information that their losses and costs have been reduced by very sizeable percentages. The National Safe Transit Coordinating Committee and its associated members are unpaid volunteers and have devoted their time and efforts to this worthy cause. It was gratifying to them when the American Trade Association Executives made an Award of Merit based on the Safe Transit Program for outstanding service to the industry as well as to the American public. We have agreed to continue our efforts unabated, envisioning the use of National Safe Transit as a valuable tool for industry.

R. F. Bisbee

A successful program for reducing packaging and shipping losses

a voluntary cooperative program which is materially reducing both manufacturers' costs and damage to packaged products in transit

THE idea for a voluntary cooperative program for the reduction of packaging and shipping losses in the home appliance and allied metal products field is now over three years old. The third anniversary of the actual inception of a working program under an organized committee is August 9, 1951.

The National Safe Transit Program has now reached maturity in that over 70 important manufacturers of appliances and other metal products are certified under the pre-shipment testing plan established by the NST Committee, with many additional companies preparing for certification. An appreciable percentage of the total production of major home appliances is now represented by the certified companies. The program has been acclaimed by manufacturers, packaging engineers, laboratories, associations, carrier groups, and packaging experts as a most valuable contribution to the improvement and shipability of packaged finished products and the reduction of packing and shipping losses.

A sound program

The basic objectives of the NST Committee remain as originally outlined: the expansion of a practical program for reducing damage to packaged finished metal products during handling and while in transit, and enlisting the cooperation of all manufacturers of these products for putting such a program into operation.

The program itself is based on a simple pre-shipment testing plan which enables the manufacturer to determine *before shipment* the ability of his packaged finished metal prod-

uct to withstand normal handling *from the production line to the consumer*.

An important feature of the program is the strictly voluntary nature of the cooperative plan.

The Safe Transit Committee confines its activities in this connection

PREMISE

All manufacturing, engineering, and quality efforts are in vain if the product reaches its destination in a damaged condition.

to test procedures for PACKAGED PRODUCTS only—neither the package nor the product is considered separately. It is not the Committee's intent to interfere with the prerogative of the individual manufacturer in his design, fabrication or packaging techniques. Pre-shipment tests as devised will predetermine whether the PACKAGED PRODUCT will arrive at its final destination safely, and in the last analysis the successful shipment of the product will stand or fall on the performance of the whole. Structural strength built into an article to overcome inadequate packaging

is costly and unreliable. Packaging strength sufficient to protect an article with a structural weakness is also costly and undesirable. In both cases, transit damage will likely be excessive. A change in the package, a change in the product, or a change in both—made on the basis of tests established by the Committee—are left wholly within the manufacturers' province.

An investment that pays

Manufacturers not now using the testing plan may procure all necessary detailed information from the following pages. In brief, only two simple test procedures are required (vibration and impact) for checking packaged products weighing over 100 lbs., and a simple drop test procedure for packages under 100 lbs. A single instrument is required for calibration purposes. For a total of approximately \$2000.00, a manufacturer may install all needed equipment for conducting the pre-shipment tests and for periodic control testing. The equipment also provides a valuable set of tools for quality control of

to Page 77 →

STATEMENT OF POLICY

The National Safe Transit Committee is simply saying to shippers:

"If you will test your packaged products by these test procedures, experience has shown that your loss and damage and your packaging costs will be acceptable minimums. It is up to each shipper to decide whether or not he will use these test procedures. The program is entirely voluntary and implies no connection with tariffs, freight rates, claim procedures or any other existing transit regulations."

NATIONAL SAFE TRANSIT COMMITTEE
1010 Vermont Ave., N. W., Washington 5, D. C.

Safe Transit test equipment

two test machines and one instrument for Project 1—one testing device for Project 1-A

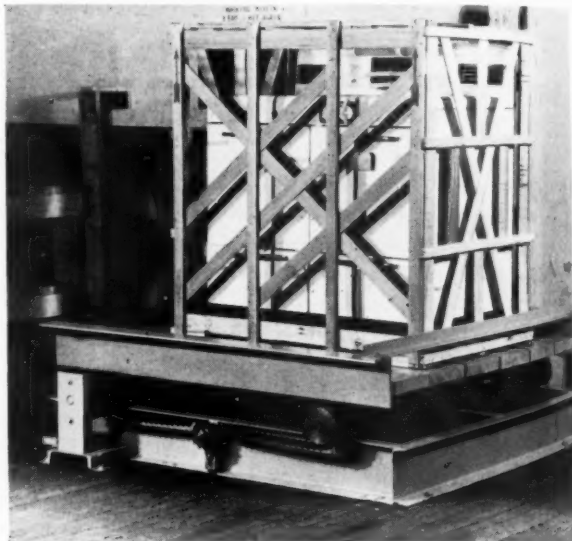
PROJECT 1

(for packaged products over 100 lbs.)

Right: Equipment for determining the ability of the packaged product to withstand vibration shocks encountered during transportation. Conditions simulated include: resonance, flat car wheels, rail joints, rough road bed or roadways, car sideways, etc.

Below: Equipment which simulates the longitudinal shocks and impacts as received in actual shipment during various kinds of transportation. Black arrow on crate indicates the proper position of calibration instrument on mounting board for accurate measurement of shocks.

Vibration testing machine



Conbur incline impact testing device



Equipment Costs

Only three equipment items required for Project 1: Conbur impact testing device, vibration testing machine, and instrument for calibrating Conbur. Total cost reported by manufacturers is approximately \$2000.

The divided table drop tester for Project 1-A costs approximately \$75.00.

The Sub-Committee of the Technical Planning Division will advise with all manufacturers seeking certification to make sure that the operation of all equipment is clearly understood.

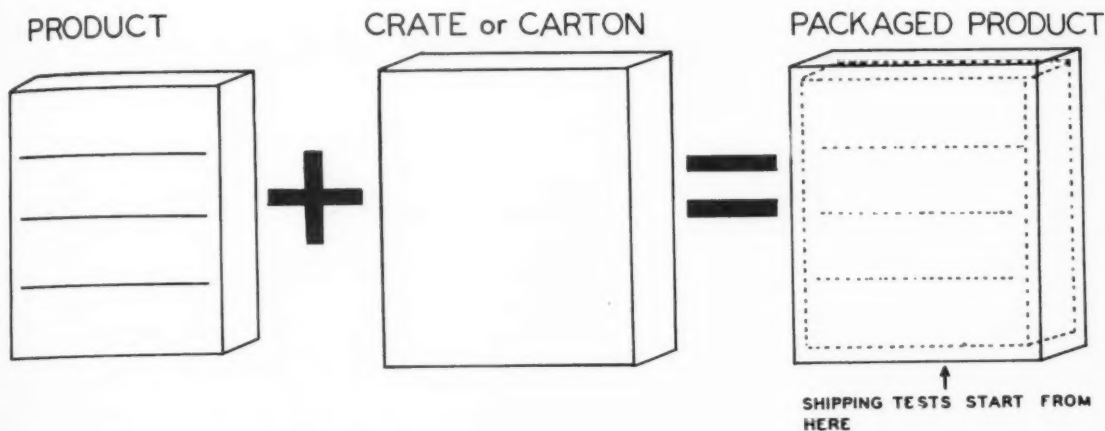
PROJECT 1-A

(for packaged products under 100 lbs.)

Divided table drop tester



This drop tester is used to simulate the shock incident to the handling in transportation of products under 100 lbs.



Testing procedure for Project I

THIS procedure for Project I of the National Safe Transit Program, as developed by the Technical Planning Division of the National Safe Transit Committee, covers testing of packaged products weighing 100 to 1000 pounds as prepared for transportation, and supersedes all previous procedures.

Test cycle shall consist of:

1. Vibration Test
2. Impact Test

Tests shall be conducted in the above order.

Vibration test equipment

L. A. B. or Seely Package Tester or other equipment producing equivalent results.

Test procedure

The packaged product shall be placed on the table of the vibration tester; fences may be attached to the test table suitable for the product being tested. Vibration frequency shall be such that the packaged product leaves the table momentarily at some interval during the vibration cycle (equivalent to acceleration of "lg+"). The test shall be conducted for a minimum of one hour.

Note: A simple method of determining "lg+" is to advance the cycle of vibration until a thin piece of

cardboard can be inserted between one bottom edge of packaged product and the platform of the machine.

Impact (longitudinal shock) test equipment

The Conbur Incline testing device or other equipment producing equivalent results.

A shock recorder known as RS two-way recorder No. 2W 330, or equivalent.

Test procedure

The container to be tested shall be placed on the dolly with the face or edge which is to receive the impact projecting two inches beyond or flush with the forward end of the dolly.

The shock recorder shall be positioned on the packaged product to record the maximum shock received during the impact test. This instrument should be mounted on a special mounting board. The mounting board should be as long as the side of the container on which it is mounted. The recorder should be placed so that a center line through the length of the recorder is at right angles to the plane of the backstop. (On solid wooden boxes no mounting board is necessary).

When conducting the test the dolly and container shall be drawn up the

incline to the predetermined position (the position shall be such as to produce impact into at least the 1st quarter of the 5th zone of the shock recorder) and released. This test shall be repeated so that each face of the container and the bottom is subjected to the impact. This shall constitute a complete standard impact test. The position of the container on the dolly and the sequence in which the faces or edges are subjected to impacts may be at the option of the manufacturer and will depend on the packaged product under test.

The packaged product shall be considered to have satisfactorily passed this test, if the product is free from damage upon unpacking.

The number of Packaged Products to be tested is left to the judgment of the manufacturer; however, the sample should be sufficiently large to assure valid results.

Note: When it is desired to create a hazard to concentrate the impact at any particular point of the packaged product attach securely a 4 x 4 wood member across the face of the backstop at the point where it will make the desired contact.

next page →

Testing procedure for Project 1-A

Testing procedure for Project I-A

THIS procedure for Project I-A of the National Safe Transit Program covers testing of packaged products, both single and multiple packed, weighing under 100 pounds as prepared for transportation.

Test cycle shall consist of:

1. Vibration Test
2. Drop Test

Tests shall be conducted in the order indicated.

Vibration test equipment

L.A.B. or Seely Package Tester or other equipment producing equivalent results.

Test procedure

and performance limits

The packaged product shall be placed on the table of the vibration tester; fences may be attached to the test table suitable for the product being tested. Vibration frequency shall be such that the packaged product leaves the table momentarily at some interval during the vibration cycle (equivalent to acceleration of "lg+"). The test shall be run for a minimum of one hour.

Note: A simple method of determining "lg+" is to advance the cycle of vibration until a thin piece of cardboard can be inserted between one bottom edge of the packaged product and the platform of the machine.

Drop test equipment

The apparatus shall consist of the following:

- (a) Divided table top drop tester such as Acme Drop Tester or other equipment producing equivalent results.
- (b) Hoist with suitable sling tripping device. Surface on which package is to be dropped must be a flat firm base (such as steel, concrete, etc.).

Test procedure and performance limits procedure

The procedure for identifying faces,

edges and corners of containers shall be as follows:

- (a) Facing one end of the container, with the manufacturer's joint, if any, on the observer's right:

Designate the top of the container as one.
The right side as two.
The bottom as three.
The left side as four.
The near end as five.
The far end as six.

- (b) Identifying edges by numbers of two faces that form that edge:

Example:
1-2 identifies the edge formed by the top and right side.

2-5 the edge formed by the right side and the near end.

- (c) Identifying the corners by the numbers of the three faces that meet to form that corner.

Example:
1-2-5 identifies the corner formed by the top, right side, and the near end.

The packaged product shall be dropped from the prescribed height (see performance limits) in the following sequence which constitutes a drop test cycle:

- (a) A corner drop on the 5-1-2 corner.
- (b) An edge drop on the shortest edge radiating from that corner.
- (c) An edge drop on the next shortest edge radiating from that corner.
- (d) An edge drop on the longest edge radiating from that corner.
- (e) A flatwise drop on one of the smallest faces.
- (f) A flatwise drop on the opposite smallest face.
- (g) A flatwise drop on one of the medium faces.
- (h) A flatwise drop on the oppo-

site medium face.

- (i) A flatwise drop on one of the largest faces.
- (j) A flatwise drop on the opposite large face.

Performance limits

1. Weight of Packaged Product—50 pounds and under. Articles—Single or multiple packaged products such as washing machine tubs, table tops, stove panels, etc. Drop—24".

1a. Weight of Packaged Product—Over 50 pounds and under approximately 100 pounds.

Articles—as in 1.

Drop—12" minimum or 72" on Conbur (optional)*

2. Weight of Packaged Product—50 pounds and under.

Articles—Completely assembled products (and allied parts) such as roasters, cookers, hot-plates, etc.

Drop—18".

2a. Weight of Packaged Product—Over 50 pounds and under approximately 100 pounds.

Articles—As in 2.

Drop—12" minimum or 72" on Conbur (optional)*.

3. Weight of Packaged Product—50 pounds and under.

Articles—Holloware.

Drop—12" minimum.

3a. Weight of Packaged Product—Over 50 pounds and under approximately 100 pounds.

Articles—As above.

Drop—12" minimum or 72" on Conbur (optional)*.

The packaged product shall be considered to have satisfactorily passed this test, if upon unpacking, the product is free from damage.

The number of packaged products to be tested is left to the judgment of the manufacturer; however, the sample should be sufficiently large to assure valid results.

* If the use of Conbur Incline Testing Device is elected, the sequence of the test will be as described under Drop Test.

The WATKINS CONTAINER

Stronger . .

Lighter . .

Labor Saving . .

1. Stronger—The Watkins Container is more rigid. It has greater resistance to "weaving." Corner cleats resist corner blows. Vertical cleats give greater column strength. It supports greater loads in the warehouse.

2. Lighter—Weight saving up to several pounds can be made in practically every case. Lighter to handle. Lighter to ship.

3. Labor Saving—Watkins Containers are 75% assembled. Only three pieces to handle. Ideal for conveyor packing and high production.

There is advertising value in every container—a traveling billboard. Can be printed in two colors on four sides. And, there is product protection—no dust or dirt can mar fine product finishes.

Watkins containers save time in the shipping department; give better protection in transit. Major appliances and any other similar products that can be shipped in a wooden crate can be shipped better in this container. Weights up to 800 pounds are being shipped.

These companies build WATKINS containers

Cornell Wood Products Co.,
Hummel & Downing Division
Coxier Container Corp.

Crate-Rite Mfg. Corp.,
Div. of Pacific Ports Ind. Inc.
Dura-Crates Co.
General Box Co.

Hemb & Martin Mfg. Co.
Illinois Box & Crate Co.
Kieckhefer Box & Lumber Co.

Lane Container Corp.
Lewisburg Container Co.
Love Mfg. Inc.

1514 E. Thomas Ave., Milwaukee, Wisconsin
446 E. 131st St., Cleveland, Ohio

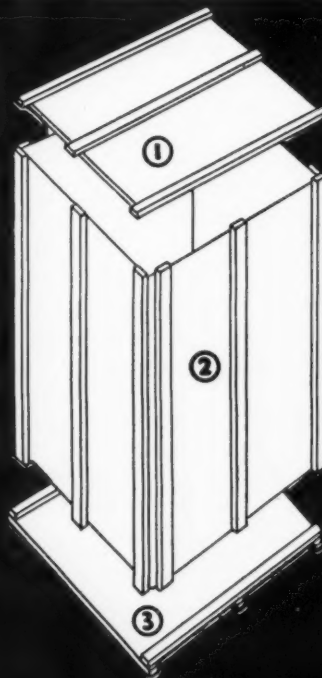
10901 Russet St., Oakland, California
940 E. Michigan St., Indianapolis, Indiana
500 N. Dearborn St., Chicago, Illinois, and
16th and Maple Sts., Louisville, Kentucky
Watseka, Illinois

811 Center St., Plainfield, Illinois
1715 W. Canal St., Milwaukee, Wisconsin
10212 Denton Rd., Dallas, Texas
243 Singer St., Lewisburg, Ohio
608 S. Commerce St., Wichita, Kansas

—an inquiry to any of these companies will get prompt attention —

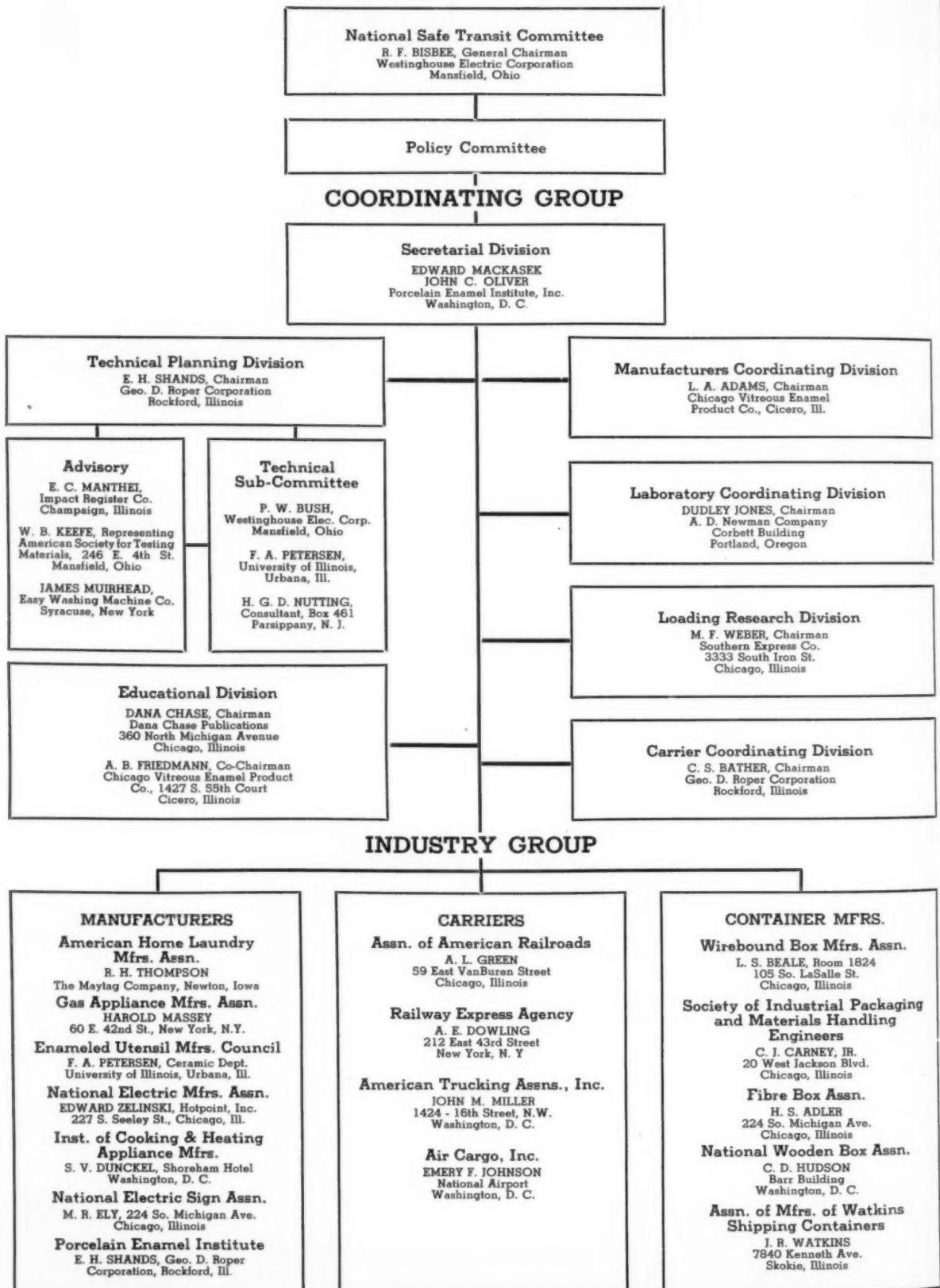


**saves storage space
75% assembled**



The · WATKINS CONTAINER · Manufacturers

ORGANIZATION CHART



Companies cooperating in Safe Transit program

THE following companies are certified under the National Safe Transit Program. They are privileged to use the N.S.T. Label.

Admiral Corporation
Chicago, Illinois

American Central Division
Avco Mfg. Corp.
Connersville, Indiana

American Stove Company
Cleveland, Ohio

American Stove Company
St. Louis, Missouri

Andes Range & Furnace Corporation
Geneva, New York

Apex Electrical Manufacturing Co.
Cleveland, Ohio

Appliance Manufacturing Company
Alliance, Ohio

Automatic Washer Company
Newton, Iowa

The Bellaire Enamel Company
Bellaire, Ohio

Belmont Stamping & Enameling Co.
New Philadelphia, Ohio

Bendix Home Appliances
Division—Avco Mfg. Corp.
South Bend, Indiana

Caloric Stove Corporation
Topton, Pennsylvania

Canton Stamping & Enameling Co.
Canton, Ohio

Central Rubber & Steel Corporation
Findlay, Ohio

Chambers Corporation
Shelbyville, Indiana

Chicago Vitreous Enamel Prod. Co.
Cicero, Illinois

Conlon Bros. Mfg. Co.
Chicago, Illinois

Conlon-Moore Corporation
Chicago, Illinois

Cribben and Sexton Company
Chicago, Illinois

Crosley Division, Avco Mfg. Corp.
Richmond, Indiana

Crosley Division, Avco Mfg. Corp.
Nashville, Tennessee

Crunden Martin Manufacturing Co.
St. Louis, Missouri

Dearborn Stove Company
Chicago, Illinois

The Dexter Company
Fairfield, Iowa

Dixie Foundry Company, Inc.
Cleveland, Tennessee

Duo-Therm Division
Motor Wheel Corporation
Lansing, Michigan

Federal Enameling & Stamping Co.
Pittsburgh, Pennsylvania

The Fletcher Enamel Company
Dunbar, West Virginia

The Floyd-Wells Company
Royersford, Pennsylvania

General Electric Company
Erie, Pennsylvania

Globe American Corporation
Kokomo, Indiana

Hardwick Stove Company
Cleveland, Tennessee

Hotpoint, Inc.
Chicago, Illinois

International Harvester Company
Evansville, Indiana

Kaiser Metal Products, Inc.
Bristol, Pennsylvania

Kuehne Manufacturing Co.
Mattoon, Illinois

Landers, Frary & Clark
New Britain, Connecticut

A. J. Lindemann & Hoverson Co.
Milwaukee, Wisconsin

Lisk-Savory Corporation
Buffalo, New York

Malleable Iron Range Company
Beaver Dam, Wisconsin

The Maytag Company
Newton, Iowa

Meadows Division, Thor Corporation
Bloomington, Illinois

Midwest Manufacturing Company
Division of Admiral Corp.
Galesburg, Illinois

Moffats, Limited
Weston, Ontario, Canada

The Moore Enameling & Mfg. Co.
West Lafayette, Ohio

Murray Corporation of America
Scranton, Pennsylvania

Murray Manufacturing Company
Murray, Kentucky

Nash-Kelvinator Corporation
Grand Rapids, Mich.

Nesco, Inc.
Milwaukee, Wisconsin

Newark Stove Company
Newark, Ohio

Norge Division, Borg-Warner Corp.
Effingham, Illinois

Norge Division, Borg-Warner Corp.
Herrin, Illinois

Norge Division, Borg-Warner Corp.
Muskegon Heights, Michigan

Odin Stove Manufacturing Co.
Erie, Pennsylvania

Perfection Stove Company
Cleveland, Ohio

Philco Corp., Refrigerator Division
Philadelphia, Pennsylvania

Prentiss-Wabers Products Co.
Wisconsin Rapids, Wisconsin

Republic Stamping & Enameling Co.
Canton, Ohio

Geo. D. Roper Corporation
Rockford, Illinois

Seeger Refrigerator Co.
Evansville, Indiana

Servel, Inc.
Evansville, Indiana

A. O. Smith Corporation
Kankakee, Illinois

Speed Queen Corp., Ironer Division
Algonquin, Illinois

The Tappan Stove Company
Mansfield, Ohio

Thor Corporation
Chicago, Illinois

United States Stamping Company
Moundsville, West Virginia

Westinghouse Electric Corporation
East Springfield, Mass.

Westinghouse Electric Corporation
Mansfield, Ohio

S. S. White Dental Mfg. Co.
Staten Island, New York

Certified Safe Transit Laboratories

Atlas Plywood Corporation
Lawrence, Massachusetts

Chicago Mill and Lumber Company
Chicago, Illinois

Container Laboratories, Inc. (2)
Chicago and New York City

Cozier Container Corporation
Cleveland, Ohio

The Fairfield Paper & Container Co.
Baltimore, Ohio (project 1-a only)

General Box Company
Chicago, Illinois

The Hinde & Dauch Paper Company
Sandusky, Ohio

Inland Container Corporation
Indianapolis, Indiana

International Paper Company
Georgetown, South Carolina

Ohio Boxboard Company
Rittman, Ohio

Package Research Laboratory
Rockaway, New Jersey

Packaging Service Corporation
Wyncote, Pennsylvania

Don L. Quinn Company
Chicago, Illinois

Rathborne, Hair and Ridgway Box Co.
Chicago, Illinois

U. S. Testing Company, Inc.
Hoboken, New Jersey



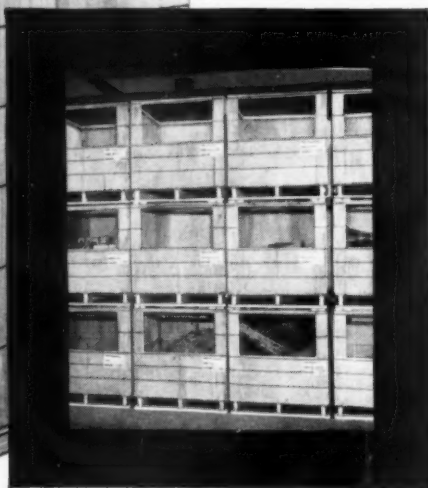
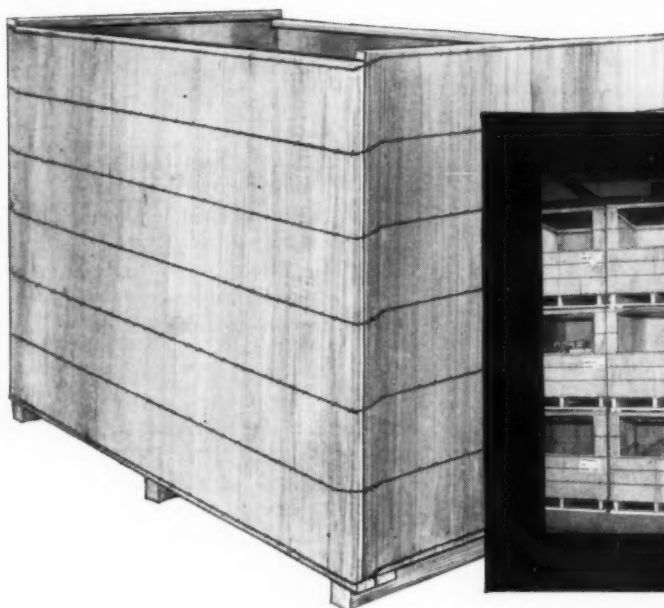
Generalift

★ ★ ★ ★ ★

pallet boxes



CUT MATERIALS HANDLING COSTS



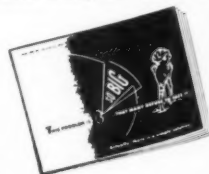
**REDUCE
STORAGE
COSTS**

- for large business
- for small business
- for ALL business

More and more manufacturers are helping solve their materials handling problems and storage problems with Generalift Pallet Boxes. It's the versatile container that sharply cuts costs . . . and helps step up production . . . because ONE workman, fork-lift truck, and Generalift Pallet Box do the work of many employees. Write us. We'll promptly provide full information on the Generalift Pallet Box, on ANY of our shipping containers.

WE WILL MAIL FREE COPY OF "THE GENERAL BOX"

This colorful booklet illustrates and describes the many advantages of the Generalift Pallet Box. We will be glad to mail upon request.



General BOX COMPANY
engineered shipping containers
GENERAL OFFICES:
514 N. Dearborn Street, Chicago 10, Ill.

★ ★ ★ ★ ★

ALL TYPES OF
ENGINEERED SHIPPING CONTAINERS

DISTRICT OFFICES AND PLANTS:
Cincinnati, Denville, N. J., Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, Sheboygan, Winchendon, Continental Box Company, Inc.: Houston, Dallas. General Box Company of Mississippi, Meridian, Mississippi

General Wirebound Crate



General Nailed Box



General Corrugated Box



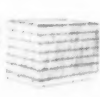
General Cleated Corrugated Container



General All-Bound Box



Generalift Pallet and Pallet Box



General Watkins-Type Box



A successful program ..

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products as well as for pre-shipment testing.

Even those manufacturers who do not install the test equipment may be certified under the program by having their PACKAGED PRODUCTS tested by one of the certified testing laboratories.

The Safe Transit label

The NST labeling plan forms a most important link between the manufacturers, the carriers, and the distributors or dealers in the loss-reduction program.

PACKAGED PRODUCTS bearing the Safe Transit label serve notice to all who handle them that their counterparts have been *pre-shipment tested* and that the shipment will withstand all *normal* transportation and handling conditions. The labels offer assurance to the jobber or dealer that the manufacturer is doing everything within his power to deliver his products in first class salable condition. Over 3,000,000 of these labels have been used.

Loading research report

The Loading Research Division of the NST Committee has developed

American Trade Association Executives Award

The coveted "Award of Merit for Distinguished Service" was bestowed by the American Trade Association Executives upon the Porcelain Enamel Institute during 1950 for the Institute's service in coordinating the activities of the National Safe Transit Program.

and published a complete set of carloading recommendations for major appliances as a part of their activity: "Safe Transit . . . A Must for Home Appliances". It is expected that the spotlight will soon again be turned on carloading techniques as an important step in the overall problem of safe shipping.

Technical planning division sponsors field research

The Technical Planning Division, headed by E. H. Shands, was responsible for the development of the pre-shipment testing procedures, and conducts close follow-up of all applications for certification.

A Technical Sub-Committee, headed by P. W. Bush, has sponsored extensive field projects in cooperation with all carriers—rail, truck and air. Summarized results of these tests have been published in booklet form: "What Happens to Your Product in Transit".

Laboratory division grows

A Laboratory Coordinating Division is responsible for making available laboratory testing service at strategic locations for use by manufacturers. A total of 16 laboratories have been certified to date.

Carrier cooperation

The carriers have been actively participating in the program through their national associations and through individual cooperation with the Carloading Committee, Technical Sub-Committee, and other divisions.

The Carrier Coordinating Committee now has underway a plan under which each of the nation's railroads will participate, through an appointed executive, in plans for a broader program of activity for these carriers to parallel the industry program. It is planned that eventually this coordinating activity will encompass all types of carriers, insofar as practicable.

What they say about the National Safe Transit Program

"tangible dividends"

Landers, Frary & Clark
New Britain, Connecticut

Participation in the National Safe Transit Program has more than justified our investment in testing equipment. A program of periodic testing has been installed in our major appliance division which has paid off some very tangible dividends in the form of decreased freight damage and less expensive packaging.

Other benefits are a speeding-up of the period between initial conception of a package and final design. Ideas

can be tried out and either rejected or accepted with the assurance that the testing has been adequate. *I have no knowledge of any packaging failing in the field that has previously passed the Safe Transit tests.*

The need for standard specifications and testing procedures has long been apparent to the industry. The chaotic condition immediately following the last war accentuated this need, and the publication *finish* is to be complimented on its part in instigating and pushing this program along.

R. J. Fernekes
Methods Engineer

"sharp reduction in merchandise defects"

Perfection Stove Company
Cleveland, Ohio

Participation in the National Safe Transit Program has meant a sharp reduction in merchandise defects caused by damage incurred in transit. Such destruction now amounts to less than one per cent of the total number of items shipped . . . *Good customer and dealer relations are promoted by proper packaging because, when crate or carton is opened, the condition of the merchandise inside*

attests to the fact that the promise of the Label — good packaging and safe transit — is not misleading.

D. A. Williams
Packaging Engineer

**"complimentary remarks
from customers"**

United States Stamping Company
Moundsville, West Virginia

We believe one of the biggest advantages of the Safe Transit Program

is in the end result. That is, the actual user of the article receives a perfect piece of merchandise. Oftentimes, the distributors failed to notice that an article had been damaged and passed it on to the user as a perfect piece of goods. This caused a general dislike for the product.

We have had complimentary remarks from customers, not only about our own products, but other manufacturers' products arriving in perfect condition since the participa-

tion in the National Safe Transit Program.

F. Steele Earnshaw
Executive Vice President

"wholehearted endorsement"

The Maytag Company
Newton, Iowa

It is my sincere belief that the National Safe Transit Program is one of the finest and most constructive ventures which has been attempted since industry started shipping appliances.

This program has been guided through a stormy period, but its success by the vast number of manufacturers who have enrolled in the program was assured from the beginning, not only because the principle was sound but because the shippers and the carriers worked together toward a common end.

I wholeheartedly and unreservedly endorse the program and recommend that all manufacturers of appliances and allied metal products join in the program and thereby reap the benefits which so many of us have already experienced, and that it be extended to and adopted by all manufacturers.

R. H. Thompson
General Traffic Manager

"results most gratifying"

Duo-Therm Div., Motor Wheel Corp.
Lansing, Michigan

We have used a closely paralleled pre-shipment test procedure to that recommended by your Committee. The results to date have been most gratifying. *Our products are now getting to the point of sale in much better condition and with far less loss through damage.*

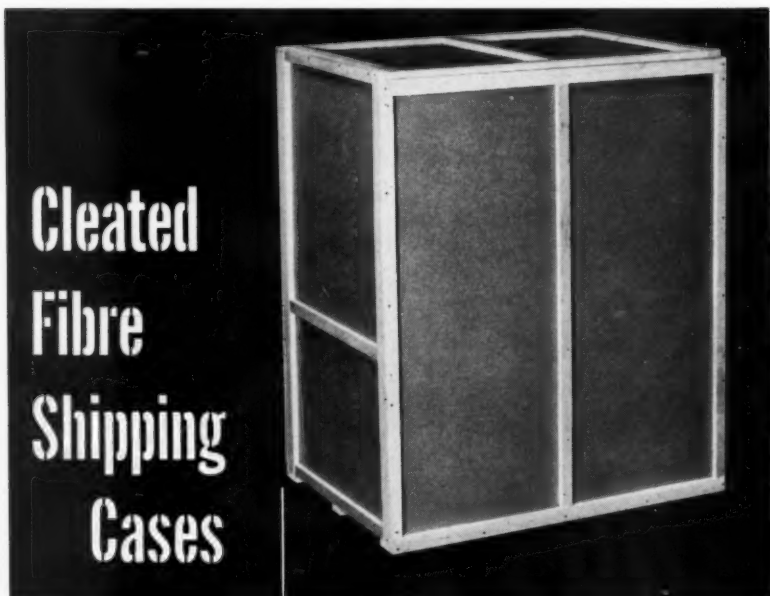
F. R. Christiansen
Industrial Engineer

"will be few damage claims"

Canadian National Railways
Toronto, Ontario

From the demonstration that was given to us (by Moffats Limited), there is no doubt that their production will stand up under more than ordinary handling . . .

We do not see how shipments of



**Cleated
Fibre
Shipping
Cases**

**FOR
Commercial
Shipments**

**FOR
Government
Shipments**

are safe, dirt-proof, strong — light in weight — comply fully with railroad and government requirements — present a clean, attractive exterior that lends itself well to advertising your product.

Cornell Cleated Fibre Cases are made at our Hummel & Downing Division at Milwaukee in many styles and sizes. We invite your inquiries for Cleated Corrugated or Cleated Solid Fibre Cases.

They comply with Government Specifications Jan-P-103 and NN-B-591.

Cornell

HUMMEL & DOWNING DIVISION, MILWAUKEE 1, WIS.

SPECIALTY PAPERBOARDS, FOLDING CARTONS, CLEATED, SOLID FIBRE, AND CORRUGATED SHIPPING CONTAINERS

WOOD PRODUCTS COMPANY

this firm can be damaged (*in transit*) by anything short of a train derailment or accident. We feel quite confident that there will be very few damage claims from this firm from now on.

H. D. Angus

Chief Inspector, Claim Prevention

damage on products shipped by Moffats has been reduced from 24% to 2% since their participation in the NST program (see "Safe Transit Reduced our Shipping Damage," October 1950 finish)

"damage appreciably reduced"

**The Floyd-Wells Company
Royersford, Pennsylvania**

Prior to the use of the National Safe Transit Program, this company suffered considerable damage in breakage of parts and chipping of enameled surfaces of our ranges, during their transit to our dealers.

With the inception of this program . . . we very appreciably reduced both — thereby reducing loss due to replacement of parts. Of equal importance was the goodwill realized by having our ranges reach our dealers in perfect condition. Both are very tangible benefits.

We do not hesitate to endorse the National Safe Transit Program, for we have had ample evidence of its value to us.

**D. Saponara
Plant Engineer**

"damage dropped to an amazingly low figure"

**Norge Division, Borg-Warner Corp.
Effingham, Illinois**

Since entering into your program and acquiring our package testing equipment (a vibration tester, an impact tester, a drop tester, and five shock recorders), we have found and corrected many weak points in our ranges as well as improved our crating and packaging methods. Our shipping and handling damage has dropped to an amazingly low figure with a great saving in dollars.

We of Norge are proud of the National Safe Transit Label placed on each crated range and of the part we have shared in this program. We are living up to its standards and will

continue with the testing procedures set up in this program.

**O. Mayhood
Inspection Foreman**

"more important than ever"

**Enameled Utensil Mfrs. Council
Urbana, Illinois**

The Safe Transit Program is more important than ever at the present time because as materials become short, changes must be made, and

the test methods outlined will point out any weaknesses that may be caused by the substitution. It is certainly advantageous to determine the shortcomings of substitutes and prepare for them rather than have them become apparent as damaged merchandise.

As further data are accumulated, it becomes more certain that the Safe Transit test results predict the shipability of packaged products; there-

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FIBER-and-STEEL STRAP CUSHIONS AS IT BINDS



**For Internal
Bracing**

**Prevents
Shipping
Damage**

**Cuts
Shipping
Costs**

FIBER-and-STEEL is steel strap with a cushion of protective Kraft paper around it. You can apply FIBER-and-STEEL directly on the enameled surfaces of stoves, refrigerators and other similar products with *no cushioning needed* between the product and the strap. The outer layers of Kraft paper protect the surface. The inner layer of steel strap binds with a slip-proof grip.

FIBER-and-STEEL saves time and materials in packing, makes uncrating easy, and leaves no adhesive stains. It is secured with a soft aluminum Gerrard seal.

**WRITE OR WIRE TODAY
FOR A TEST DEMONSTRATION
IN YOUR PLANT**



A. J. Gerrard & Co.

1958 Hawthorne Place, Melrose Park, Ill.
(Chicago Suburb)



Strap calculator. Write for your free copy.

M. F. WEBER, Chairman,
Loading Research Division



E. H. SHANDS, Chairman,
Technical Planning Division

F. A. PETERSEN
Technical Sub-Committee, also
Enameled Utensil Mfrs. Council



L. A. ADAMS, Chairman,
Mfrs. Coordinating Division



DUDLEY JONES, Chairman,
Laboratory Coordinating Division

A. B. FRIEDMANN, Co-Chairman,
Educational Division



M. R. ELY
National Electric Sign Assn.



JOHN C. OLIVER
Secretarial Division

THE SARAN COMMISSION

(Photos of Committee personnel on
Additional page)

C. J. CARNEY, JR.
Society of Industrial
Packaging & Materials Handling Engineers



R. F. BISBEE, General Chairman,
National Safe Transit Committee

EDWARD MACKASEK, Chairman,
Secretarial Division



R. H. THOMPSON
American Home Laundry Mfrs. Assn.



EDWARD ZELINSKI
National Electrical Mfrs. Assn.

TRANSIT
PERSONNEL

(The persons shown are unavailable.)

(Continued on following page)



A. L. GREEN
Association of American Railroads



HAROLD MASSEY
Gas Appliance Manufacturers Assn.



L. S. BEALE
Wirebound Box Mfrs. Assn.

P. W. BUSH
Technical Sub-Committee



C. D. HUDSON
National Wooden Box Association

E. F. JOHNSON
Air Cargo, Inc.



J. M. MILLER
American Trucking Associations, Inc.



JAMES MUIRHEAD
Advisory Staff

J. R. WATKINS
Assn. of Mfrs. of Watkins Shipping Containers



H. G. D. NUTTING
Technical Sub-Committee



W. B. KEEFE
Advisory Staff

E. C. MANTHEI
Advisory Staff



Comments on Safe Transit

→ from Page 79

fore, this program is based on sound principles and is proven by the only sure method — results.

F. A. Petersen
Research Professor
University of Illinois

"low level shipping losses"

Westinghouse Electric Corp.
Mansfield, Ohio

Westinghouse has always been behind a program of scientific methods for pre-shipping tests. *We are in full accordance with the National Safe Transit testing program* and our experience following it has been the maintenance of our shipping losses on a very low level.

Reese Mills
Assistant General Manager
Electric Appliance Division

"led to better crate design"

The Tappan Stove Company
Mansfield, Ohio

The standard tests (vibration and impact) have led us to a better crate design. Fortunately, *the new crate which was designed to resist the standard tests turned out to be less expensive than the old one.*

G. L. Dobson
Chief Production Engineer

"should be cited for an industrial award"

National Wooden Box Association
Washington, D. C.

We think that your (National Safe Transit Committee) job is of such value to American industry and of such noteworthy achievement that management of the National Association of Manufacturers should cite you (the committee) for an industrial award.

We have always believed that shipping containers should not be merely a specification, but should stand on performance and yours is definitely a step toward making a container perform. After all, it is not the con-

tainer that the customer is paying for. He is paying for your product, and your good will is the factor that is at stake — and repeated business. Only through performance of containers can you expect to maintain solvency of your business.

W. N. Sardo

such an award has been made by the American Trade Association Executives (see "International Trade Association Award Based on National Safe Transit Program," December 1950 finish, page 70)

"gaining attention & respect"

A. O. Smith Corporation
Kankakee, Illinois

We are following the test procedure as outlined for Project I with our crated product.

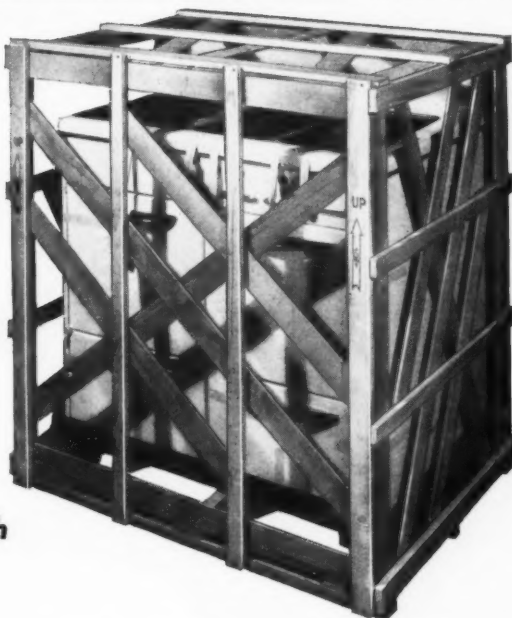
We have had many indications in the field that this Safe Transit Program is gaining wide attention and respect. As previously stated, we want to say again that we are 100% for

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WEYERHAEUSER CRATES

**OPEN
FOR
INSPECTION**

**...Yet 65%
More
Bracing Strength**



● This is an open crate . . . designed for full visibility and inspection for damage . . . without the need or expense of uncrating.

This crate is 65% stronger than ordinary strut crates. Diagonal bracing, the strongest type of bracing, is employed. The bracing is positioned not only for rigidity and strength, but to give adequate coverage and protection.

Weyerhaeuser crates are delivered in sectional form, ready for assembly. By nailing crates at the corners,

secure joining with maximum strength and rigidity is obtained. Drilling for nails is eliminated since the crate members requiring nailing are soft hardwoods which receive nails easily without splitting. You save money in assembly.

Crates are furnished in one-man bundles or may be strapped in larger bundles for palletized handling.

Weyerhaeuser offers a dependable crate engineering service and source of supply, backed by 18 years of experience. Inquiries are invited.

WEYERHAEUSER SALES CO.

INDUSTRIAL WOOD PARTS DEPARTMENT
Room 2134 • 400 West Madison, Chicago, Illinois

8,000,000 NST labels used

acceptance of NST label illustrates progress of Safe Transit program

PRE-TESTED SAFE TRANSIT SHIPMENT

This **PACKAGED PRODUCT** meets the pre-testing standards established by the National Safe Transit Committee and will withstand **ORDINARY** transportation and handling hazards.

NATIONAL
SAFE TRANSIT
COMMITTEE



1010 VERMONT AVE., N. W.
WASHINGTON 5
D. C.
©

MAKE SAFE HANDLING YOUR JOB !

Notice of Certification

ON the right is shown a "notice of certification" which a manufacturer receives after he has submitted proof that he is conforming to the testing procedures recommended by the National Safe Transit Committee.

Certification requires that the manufacturer actually have the pre-shipment testing equipment in his plant and test in accordance with Safe Transit procedures, or that he meet these requirements through the facilities of testing laboratories certified by the NST Committee.

A CCEPTANCE of the Safe Transit Program by certified manufacturers has resulted in more than 8,000,000 packaged products, bearing the NST label, announcing to distributors and dealers that the manufacturers are doing everything possible to assure safe delivery of their home appliances and other metal products.

More than 8,000,000 packaged metal products have been identified with this label, thus promoting better handling in transit for the products to which they were affixed.

The label's attention-getting colors (actual colors red and yellow) attract the notice of loaders and transit men. The label itself points out that the packaged product has been tested prior to shipment, and it will arrive undamaged with normal handling.

Product manufacturers, dealers and distributors, and carrier representatives all agree that better treatment of the packaged unit results when the NST label identifies the shipment.

NATIONAL SAFE TRANSIT COMMITTEE

This certifies that

GEO. D. ROPER CORP.

ROCKFORD, ILLINOIS

has accepted and will conform to the testing procedures of the National Safe Transit Program and is hereby authorized to use the National Safe Transit Label on packaged units so tested.

from JULY 1, 1949 to DECS, 1949



N. B. Bisbee
Chairman
Edward M. ...
Secretary

Date July 2, 1949

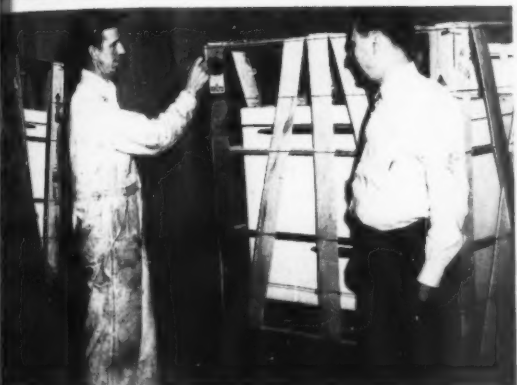
Applying the SAFE TRANSIT LABELS

Left: R. H. Meiners, chief engineer, Lindemann & Hoverson, Milwaukee, observes application of Label to a crated range. Right: M. A. Ritchie, of Roper, Rockford, Ill., points to Label on a Roper packaged product.



Left: Walter Hagman (left), chief engineer, and Hank Owen, project engineer, Globe American, Kokomo, watch application of Label to a crated Dutch Oven range.

Right: D. A. Williams, Jr., packaging engineer, Perfection Stove, Cleveland, points to Label on packaged range. Watching are J. A. Podojil, for more than 20 years chairman of Perfection's packaging committee, and F. R. Stein, traffic manager.



Left: F. C. Heyl, manager of quality control, Westinghouse, East Springfield, Mass., watches application of Label to packaged water cooler.

Right: R. H. Thompson (left), general traffic manager, Maytag, Newton, Iowa, views Label applied to a packaged automatic washing machine.



Left: R. E. Heine (left), chief inspector, and H. J. Holbrook, director of electric range and heater division, watch application of Label to crated range at Norge plant, Effingham, Illinois.

Right: A. McGinness (left), traffic manager, and Carlyle Stoltz, crating engineer, Servel, Evansville, are shown viewing Label applied to a crated refrigerator.



Comments on Safe Transit

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this program and would like to be helpful in any way possible.

Waldo Higgins
Chief Engineer

"NST was the answer"

Association of American Railroads
Chicago, Illinois

Enthusiastic endorsement of this program has been given by the rail-

roads individually and by this association. They like especially the purely voluntary character of the effort to solve the problem . . . The recommended procedure certainly is far superior to the method ordinarily followed of analyzing damage causes over a long period of time, with identical failures occurring, each one adding to the damage with so much loss and annoyance to all concerned.

The claim prevention departments of American railroads are busily en-

gaged in an all-out effort to reduce the damage-risk of these products through careful handling of individual shipments, careful switching of cars, personnel training, and effective systems of reporting improper service to the yard or station responsible therefor. . . .

Lewis Pilcher
Executive Vice-Chairman
Freight Claim Division

"we are backing it 100%"

Geo. D. Roper Corp.
Rockford, Illinois

We at Roper recognize that the safe transit of appliances affects everyone in the gas range industry. We feel that the program of the National Safe Transit Committee is of extreme importance to carrier, manufacturer, and customer alike, and we are backing it 100 per cent in every way possible.

Stanley H. Hobson
President

"teamwork is required"

Hotpoint, Inc.
Chicago, Illinois

It is felt that the program outlined under Project I is a shipper step in the right direction towards eventual conquest of the freight claim problem, and corresponding efforts on the part of carriers should relegate "freight claims" to a level of unimportance.

J. G. Borson
Traffic Manager

"has proved invaluable"

Newark Stove Company
Newark, Ohio

We have used the Incline Impact Test and Vibration Test for eight years. *Every piece of crated new merchandise is pre-tested.*

This equipment, part of which can be built in any carpenter shop, has proved itself invaluable. One additional desirable result is that we do not "over-build" our crates.

F. H. Guthrie
President



Our laboratory
is
approved by
the
National
Safe Transit
Committee

PROGRESS of a Century

If you should check a list of companies operating in the United States in 1855 — the year of our founding — you would find that very few indeed have been able to survive the economic upheavals of nearly a century. Survival is conditioned upon maintaining high quality standards at all times.

SUPERSTRONG boxes and crates have always enjoyed a reputation for dependability because of their sturdy construction . . . SUPERSTRONG container design has been quick to adapt to changing shipping conditions . . . SUPERSTRONG service is undergoing constant expansion in order to handle customer requirements more quickly and efficiently.

You can't go wrong with SUPERSTRONG.

RATHBORNE, HAIR AND RIDGWAY BOX CO.
1440 WEST 21st PLACE • CHICAGO 8, ILLINOIS

20TH PACKAGING EXPOSITION, CONFERENCE OPENS APRIL 17

One of the features of the 20th National Packaging Exposition and concurrent Conference on Packaging, Packing and Shipping will be a session on "Military Packaging Requirements" with packaging experts from the Air Force, Army, and Navy participating in the discussion.

Another session will be devoted to a forum at which various companies will tell how they solved their packaging problems. Of interest to manufacturers of appliance and allied metal products will be a talk on "Designing the Package as Part of the Product" by Charles D. Mattingly, of The Coleman Company, Inc., Wichita, Kansas. (Read "Pre-Proving Pays", by Mr. Mattingly, March 1951 finish. Page 67.)

The Exposition will be held in Atlantic City, N. J., April 17, 18, 19 and 20. Attendance at the 1951 Exposition is expected to include 15,000 representatives of packaging suppliers and users from all over the United States as well as several hundred visitors from Canada and representatives of more than 29 foreign countries. The event is sponsored annually by the American Management Association.

WILLIAM GRIMSHAW DIES

William Grimshaw, 62, an executive vice president of Continental Box Company, a subsidiary of General Box Company, died January 25, at his home in Dallas, Texas. Grimshaw was an old-time figure in the wooden box business. For years he was president of Republic Box Company before it became a part of General Box Company.

"GOOD NEWS" FOR COOKING, HEATING APPLIANCE MFRS.

The Trans-Continental Freight Bureau has announced that application No. 6506, covering a proposal to increase trans-continental rates on heating and cooking apparatus, has been cancelled by action of the Executive Committee.

The proposal sought to restore rate

parities on westbound carloads of heating and cooking apparatus, including furnaces, stoves, ranges, radiators, broilers, water heaters, gas logs

and related articles. It was planned to increase all such rates when necessary to restore parity with the highest rated point in related groups.

AMERICAN BOX RECEIVES INDUSTRIAL SAFETY AWARD



Safest woodworking plant in Ohio was the honor bestowed on The American Box Co., Cleveland, a feature of the 20th annual Greater Cleveland Industrial Safety Campaign, it was announced recently by George H. Kubes, company president. "We lost no manhours due to injuries during the entire year," he stated.

The Safety Award, a yearly cita-

tion approved by the Industrial Commission of Ohio, was presented to representatives of American Box: Henry S. Kubes, vice president, and Edward A. Kubes, production superintendent (right and left respectively in photo).

The Cleveland firm is one of the nation's "Big 5" manufacturers of wirebound crates, wood cleated panel boxes, and nailed wood boxes.



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"I saw your ad in finish"

Tooling for limited production

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cast resin pattern (matrix) which is coated with a suitably conductive film to allow uniform plating. After plating to a thickness to give the desired strength, the plastic pattern is removed and reinforcing members are welded to the back of the die. Copper tubing for carrying the die heating medium is then coiled flat against the back. Sprayed metal is then applied over the tubing and the back of the die to increase thermal conductivity.

These electroformed dies are employed similarly to cast phenolic resin dies, but in applications where a larger number of parts will be formed. The cast phenolic resin dies are ideal for experimental tooling or for short run production, but when from 500 to 1000 parts must be formed, the electroformed dies, despite their greater initial cost, will prove more economical in the longrun. The metals generally employed in electroforming are nickel or a nickel and copper alloy.

The various techniques discussed in this article relative to the development of limited production tooling were necessarily sketchy. But each can serve as a springboard for new ideas and new methods of tooling more in line with production requirements brought about by critical defense contracts. Many of these contracts do not provide for extensive production of any one part. When limited production is indicated, tool costs become highly critical and are often the deciding factor between gain and loss on the work. This is where cheaply constructed yet efficient limited use tooling pays big dividends.

The Thing

by Nelson H. Kehl*

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